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Determinants of worldwide foreign equity portfolio holdings

&

impact of foreign equity portfolio flows on global financial linkages of emerging markets

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Abstract

This thesis comprises of four empirical studies. The first three empirical studies identify and investigate the role of different factors explaining the cross sectional and temporal variation of foreign equity portfolio holdings for thirty-six developed and developing host countries. The fourth empirical study demonstrates the impact of foreign equity flows on global financial linkages of four Asian emerging markets.

Our first three empirical studies use foreign equity portfolio holding data on 36 host countries and employ different panel data models. Our survey of the literature shows that only few studies (two to the best of our knowledge) have modelled the bilateral cross-country foreign equity portfolio holdings on a global basis. Further, unlike previous studies, which use cross-section models, we test all our hypotheses using relatively more efficient *random effect* and more robust *fixed effect* panel data models.

The first empirical study examines three hypotheses demonstrating the association between three different components of transaction costs (commission, fees and market impact) and foreign equity portfolio allocation (FEPA). To the best of our knowledge, we are first to comprehensively test the role of each of the components individually and collectively in modelling FEPA. Addressing several robustness issues, we show significant and robust effect of transaction costs with clear evidence that foreign investors tend to underweight countries with higher transaction costs.

In our second empirical study we test five hypotheses investigating the role of country specific equity market characteristics (CSEMC) in explaining FEPA. We use five different variables as proxy of CSEMC, such as stock market development/size, market liquidity, emerging market dummy, equity return volatility and exchange rate volatility. We are first to use the later two volatility measures in modelling FEPA. Consistent with theory, the results show that all the CSEMC factors tend to have strong and statistically significant effect on foreign equity portfolio allocation decisions.

Our third empirical study investigates the relationship between investor protection and FEPA. The existing findings on the role of investor protection are highly controversial with divided views and contrasting conclusions. By including three different measures, we demonstrate that investor protection right, particularly the one specific to foreign investments, is also an important feature influencing allocation decisions.

Finally, in our fourth empirical study we use daily foreign equity flow data for four Asian emerging markets. Application of co-integration and vector error correction (VEC) models provide strong indication that the increase in foreign equity flows is driving the global financial linkages of the Asian emerging markets. Using different variants of VEC model, our investigation also demonstrates that foreign investors in the selected Asian emerging markets engage in momentum trading strategy and flows have significant effect on the local equity market (price pressure hypothesis).

Overall, our study concludes that stock market development features are the most important inputs in the worldwide foreign equity portfolio allocation decision. Furthermore, there is an indication that the growing foreign equity portfolio flows are, in part, responsible for the increasing global financial linkages of the Asian emerging markets.

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Chapter 1 Introduction: background and summary of findings

1.1 Foreign equity portfolio investment: A background

International or foreign equity is defined as investment in equities of corporations located outside the domicile of home country[1]. Almost thirty-five years ago, Bruno Solnik published an article with the title "Why not diversify internationally rather than domestically" in the *Financial Analyst Journal* (July/August 1974a). Solnik and McLeavey (2009) note that at that time, the U.S pension funds had never invested outside the United States. The situation was not much different in other countries (except for U.K.) in which there were legal restrictions on foreign investments and investments in foreign securities were regarded as exotic. Although European banks and private investors, to some extent, have long been foreign investors by cultural heritage and necessity (given the small size of the countries), institutional investors' guidelines limited or proscribed foreign investment. Because institutional investors are regarded as large and sophisticated investors, their absence from the foreign investment arena was considered significant.

Solnik and Mcleavey (2009) remark that during early 1970s a number of factors, such as poor information, lower expertise with regard to global asset allocation and stock selection, restrictive regulations, and high transaction costs restricted foreign investments. However, with gradual removal of these restrictions, the benefits of international diversification for improving the risk-return profile of domestic portfolio have increasingly been recognized (for details see chapter 2). Figure 1-1 provides a general trend of the total foreign equity portfolio holdings (assets) on a global basis as reported by IMF for the recent period of 2001-2006. The table shows a significant growing interest in holdings of foreign equities by global investors. Solnik and Mcleavey (2009) note that the increasing interest is driven by the well-known phenomenon called *globalization of financial markets*. They further posit that the global integration of financial markets and its associated benefits, such as reduced transaction costs, easier access to information, round-the-

[1] The terminology on foreign investment varies across countries. Americans use the word *international* to refer to non-American investments and *global* to American plus non-American investments. Other English speaking nationals prefer to use the word *foreign* to denote nondomestic investments and *international* refer to domestic plus foreign investments. For the purpose of this thesis *foreign*, *international* or/and *global* are used interchangeably throughout the text and refer to nondomestic investment.

clock computerized quotation/trading, and development of expertise by major financial institutions may have contributed to the growth in foreign equity portfolio investment.

…….Insert Figure 1-1 about here, see page 18……..

Many studies also document gradual removal of controls on foreign portfolio investments by developed countries beginning early 1980s (French and Poterba, 1991) and developing countries beginning early 1990s (Bekaert, 1995 and Bekaert and Harvey, 2003). Removal of cross border restrictions within European Union countries allowed European-based investment management firms to freely market their financial products to other European-member states. Similarly, Solnik and McLeavey (2009) further attribute the convergence of international accounting standards, bank regulations and standard and ethical principles of investment profiles as the other possible drivers for the rapid pace in the growth of foreign portfolio investments.

Furthermore, domestic investors also need not go abroad or use services of foreign brokers/market makers to diversify internationally. Solnik and McLeavey (2009) identify several ways to accommodate foreign equities in domestic portfolios. Investors may use *Global Shares* or *American/Global Depository Receipts*. Some large companies enlist their equities on several major stock markets around the globe. Multinational companies such as Royal Dutch/Shell and BP, are now traded on more than a dozen markets. In United States and also in few other countries, trading may also take place in the form of negotiable certificates representing ownership of shares of the foreign company, referred as American Depository Receipt (ADR) in U.S or Global Depository Receipt in Europe. For example, in case of U.S., under such depository receipt arrangement, foreign shares are deposited with a U.S bank, which then issues ADRs in the name of foreign company. ADR is an easy and direct means of having exposure to a foreign market. Although buying ADR is an alternative for retail investors, it is more costly than direct purchase abroad for the large institutional investors. Another disadvantage of ADR is that only a limited number of large companies have issued ADRs representing a small proportion of foreign market capitalization and therefore they do not tend to offer full international diversification.

Similarly, domestic investor can have indirect foreign equity exposures in their portfolios by buying country funds (closed and open-end). A closed-end country fund is an investment company that buys shares in foreign market and in turn, issues its own share in the domestic market. The price is determined by demand and supply of the fund. The numbers of shares traded are usually fixed and cannot be redeemed. However, they could be traded on the stock market. Although closed end fund allows better diversification to a particular region or country than ADRs, it is still an inferior substitute to direct investment in foreign markets, even for most emerging markets. In case of an open-end country fund, usually called mutual fund, shares can be purchased and redeemed at net asset value (NAV) owned by the fund. Most of these funds now take the form of index funds tracking an international index of developed and/or emerging markets. Finally, Exchange Traded Fund (ETFs) is also a novel form of index fund that could be traded on a stock market like shares of any individual company (see Gastineau, 2001). These funds could be traded anytime during market hours and also could be sold short or traded on margin. Since they track an index rather than individual company, ETFs have been a major success in early 2000s as they provide greater diversification opportunities and have lower cost than the traditional mutual funds. Further details on the various means of foreign equity exposure are provided by Solnik and Mcleavey (2009).

The above discussion suggests that a number of factors have contributed towards the growth of foreign equity investments. Before we discuss the general research question and the associated theories and empirical literature, it is worth exploring the intriguing question from the perspective of the countries receiving these investments: What are the effects of increased foreign equity portfolio investment on domestic capital markets and ultimately on economic growth? This ensures that in addition to academic contribution, our study has genuine policy implications.

1.2 Benefits and concerns of foreign equity portfolio investments for host countries

Development of capital markets, particularly equity market, became one of the top priorities in last three decades. Errunza (2001) states that the emphasis to develop local equity market, particularly in developing countries, was triggered by the failure of the obsolete non-market based strategies and realization of the potential role that private initiative and private capital can

play in the economic development. The resulting development of local equity markets created conducive investment climate for attracting foreign equity portfolio investments (FEPI). Consequently, many countries have relaxed capital control restrictions on foreign investments to further develop their domestic capital market, attain more efficient risk sharing and resource allocation, as well as to mobilize and improve the structure of their external finance. These strategies were followed by developed countries during 1960s-1980s and during 1990s by developing countries seeking to drive the growth of their economies. Since the debt crisis of early 1980s FEPI has become the second biggest source of international investments in developing countries (Errunza, 2001).

Errunza notes that although the growth in FEPI has number of beneficial effect, they are also at times been blamed for destabilizing markets and triggering occasional crises (1994 Mexican and 1997 South East Asian crises). The concern has been that FEPI drives regional and global co-movements and the fickle short run nature of foreign equity flows has significant influence on local equity market. This makes the local capital market highly sensitive to flows and a sudden reversal in portfolio flows may potentially destabilize capital markets as well as economies.

In light of the debate among policy makers, we briefly assess the literature on the costs and benefits of FEPI.

1.3 Role of FPEI in capital market development

Errunza (2001) suggests that the growth of foreign equity investments promotes globalization of domestic capital markets and financial globalization in turn contributes to the development of local capital market. This would ultimately have positive impact on the growth of the local economy. In the following sections, we discuss a number of interrelated and reinforcing influences of FEPI.

1.3.1 Information, institutions and regulation

Although efficient functioning of capital market is a prerequisite for attracting FEPI, the growing presence of foreign portfolio investors demands timely and reliable information, minority shareholder protection and adequate market/trading regulations. The pressing demand of foreign

investors should necessitate development of new institutions and services encouraging transfer of technology and training of local personnel.

1.3.2 Investor confidence and market development

With active participation of foreign investors, local investors also develop confidence in their local market as they perceive that the risk is shared by foreign investors and therefore more domestic financial resources could be mobilized. Similarly, with the growth of foreign equity investments local capital market becomes more active and efficient and is able to support new issues including privatizations. Ngugi et al., (2003) use event study on Kenyan equity market and investigate the micro-structural effect before and after the institutional changes, which include allowing foreign investors to invest in local market. They demonstrate that free entry of foreign investors has positive influence on market micro-structure including temporary rise in liquidity, fall in volatility and efficiency gain. Although some studies claim no changes in liquidity and efficiency in price discovery process (Chang et al., 1999), majority supports the positive influence of allowing foreign investments. Stulz (1999) also finds that foreign investors provide the much needed market liquidity and increase in the valuation of local market.

1.3.3 Corporate control

In many countries, the status for corporate control, particularly in emerging markets, is in its infancy stage given the evolving state of markets and group approach to business organisations and management (Errunza, 2001). Foreign equity portfolio investors can act as monitor and play disciplinary role in the markets by demanding managerial performance, by monitoring managers' activity, and ultimately by their investment decisions. In summary, foreign investors can infuse the concepts and practice of shareholder value and free market culture in the local mindset.

1.3.4 Resource mobilization

Development of capital market, increased liquidity and supply of equity securities, and provision for better information should improve access to international capital markets in terms of floating depositary receipts, country funds, global shares and exchange traded funds and should reverse capital flight. Errunza (2001) argues that the contribution of FEPIs to market development, their impact on capital flight, and potential tapping of foreign savings through foreign listings should

all contribute towards increased resource mobilization. The increased participation and confidence shown by foreign investors also complements in upgrading the country's sovereign borrowing capabilities in international market.

1.3.5 FEPI and globalization

Increase in FEPI leads to financial globalization and the effect of globalization is mainly reflected by decline in the cost of capital and projection evaluation.

1.3.5.1 Cost of capital

Bekaert and Harvey (2003) note that theoretically financial liberalization measures should integrate local markets with global capital market and influence the pricing of securities. With growing foreign investments, foreign investors' purchase should bid up prices of domestic stocks and lower expected returns. As local capital markets integrate globally, they are exposed to common global sources of risk and move more in tandem with globally integrated markets. There are number of studies (Errunza and Losq, 1985; Henry, 2000 and Bekeart and Harvey, 2003) which demonstrate that by opening local capital markets to foreign investors, on average, the local cost of capital decreases in response to global pricing of domestic securities.

Bekaert and Harvey (2000) measure how liberalization affects the equity generating process in 20 emerging markets with primary focus on the cost of equity capital. With a number of robustness checks across specifications, they demonstrate that dividend yields decline after liberalization, but that the effect is always less than 1% on average. Edison and Warnock (2003) show that the decrease in dividend yields (cost of capital) is much sharper for those countries that experience more complete liberalization and attract greater inward foreign investment. Similarly, Henry (2000) also observes similar results using a number of emerging markets.

1.3.5.2 Project evaluation

Errunza (2001) claims that increased efficiency of an open and globally integrated local capital market should assist in better allocation of resources. A more open and developed capital market provides better market signals, which in the presence capital control, may be noisy in a thinly traded closed market. The positive impact of foreign investments on development of local capital

market not only improves allocation efficiency but as Sweeney (1993) notes the evaluation of productive projects also becomes more tractable. In a closed market, the cost of capital (discount rate) is higher and the number of priced factors (commanding risk premium) are likely to be more when compared with an open and globally integrated capital market. As such, in a thinly traded closed capital market, it is difficult and costly to identify a project's exposure to multiple risk factors. This suggests that if there are no comparable protects already in the economy, it will be difficult to evaluate the risk and return characteristics of new projects. However, as Errunza (2001) documents, in an open economy and integrated capital market, the evaluation process becomes relatively easier because domestic investors can substantially benefit from the action of foreign investors and their knowledge in terms of identification and estimation of priced factors. In summary, liberalization of financial market and subsequent foreign investment should better facilitate the assessment of real domestic investments.

1.4 Primary concerns

Although our preceding discussion suggests the beneficial impact of FEPI, it would be not prudent to ignore the worries of FEPI debated in the literature. The primary concerns are related to the impact of short term flows on local capital market, particularly for emerging markets where it is generally argued that lack of adequate, timely and reliable information along with weak institutional frameworks fail to support and manage the flows (Gelos and Wei, 2005).

Many studies examine the role of foreign equity flows using a-theoretical models with some reporting evidence of destabilizing effects caused by panic trading of foreign investor (for example see Cumby and Glen, 1990; Bekaert and Urias, 1996; Borensztein and Gelos, 1999, and Richards, 2005). Krugman (1998) documents that " in 1996 capital was flowing into emerging Asia at the rate of about $100 billion a year; by the second half of 1997 it was flowing out at about the same rate." He also suggests that imposition of capital controls on foreign investments could be used to stabilize the markets. Bekaert and Harvey (2003) posit that Malaysia re-imposed such control on foreign investments in October 1998 with an aim to thwart the perceived destabilizing actions of foreign speculators. Johnson and Mitton (2003) document that a faster growing economy like China still maintains restrictions on flows of foreign funds and Russia and Korea are debating benefits associated with free flow of foreign funds. Hence, on the

one hand, net portfolio flows should lower the cost of capital for local economies and help finance their growth; on the other hand, the experience from 1997 Asian financial crisis shows that volatility caused by portfolio flows could have detrimental impact. The three primary concerns are related to increased volatility, including spillover of volatility, dynamic relationship of flows and local equity returns, and contagion effect.

1.4.1 FPEI and volatility of local returns

Errunza (2001) argues that there is no theoretical reason to believe that foreign investments should increase volatility of local equity markets. Finance theories do not explicitly predict that volatility of local market should increase once the market liberalizes and foreign investments begin to flow in (see Bekaert and Harvey, 1997, 2003 for details). Errunza (2001) demonstrates that the evidence on the impact of local volatility is weak. Bekaert and Harvey (1997) show that there is no significant impact on the unconditional volatility. Further, Bekaert and Havery (2003) argue that it is not obvious from finance theory that volatility should increase or decrease when markets are opened to foreign investors. However, volatility, particularly in emerging markets, has also been linked to irrational herding behaviour of foreign investors. Herding behaviour is observed when investors follow each other's activity and generally trade as a group even when the prevalent fundamentals do not warrant such behaviour.

Using data from South Korea, Kim and Wei (2002) report that non-resident foreign portfolio investors are more likely to engage in herding than investors who have branches/subsidiaries in South Korea and the former may seems to have caused greater volatility in emerging equity markets, which is a matter of concern to the policy makers.[2] Aitken (1998) and Kim and Wei (2002) argue that because foreign investors pay little attention to the long term fundamentals and are largely involved in herding, fickle portfolio flows may significantly increase volatility of equity returns and may destabilize the markets. Aitken (1998) also claims that the changing

[2] There are several examples of interventions by policy makers concerned with the negative impact of foreign equity flows. For instance, Malaysia imposed capital controls in 1998 following the Asian financial crisis with an aim to control the excessive volatility that seems to be the result of rapid outflow of foreign capital. In December 2006, the Thai government tried to impose tough controls by requiring investors with more than $20,000 of investment to remain invested for a minimum period of one year or face severe penalties if this investment is removed within a year. However, the government had to reverse this decision following a steep fall in the stock market after shares suffered their worst daily fall in 16 years with the fall of 14.8%.

sentiment of institutional investors in emerging markets, owing to feedback and momentum trading, at times may create short-term bubble-like booms and bursts. Such studies are in sharp contrast to the arguments of Errunza (2001) and Bekaert and Harvey (2003). Similarly, Stulz (1999) finds no destabilizing effect of portfolio investments on the local equity markets in emerging countries. Hamao and Mei (2001) document no impact of foreign investments on the volatility of Japanese market. Choe et al., (1999) also find no evidence that foreign equity flows have any destabilizing effect on Korea's market during the Asian crisis of 1997.

Similarly, regarding volatility spillover from equity returns of develop markets, Errunza (2001) again argues that there is no strong theoretical reason to suggest that cross-country correlation should rise. However, with effective financial liberalization the inflow of FPEI should integrate the local equity market with its global counterparts. In a fully integrated market where risk premium is determined on global basis, it is intuitive to expect that foreign events may have some impact on local equity markets. If this is the case, then the volatility in developed markets may influence volatility of local emerging markets.

1.4.2 Joint dynamics of foreign equity portfolio flows and local equity returns

The destabilizing effects of foreign investment are also attributed to the number of studies investigating bi-directional causality and short run dynamic relationship between flows and local equity returns. If flows are highly influenced by recent domestic returns, it signifies trend chasing, positive feedback or momentum investments. Momentum investments imply selling of recent losers and buying recent winners. Bekaert et al., (2002) find strong feedback or momentum trading behaviour and suggest that equity investors extract excessive information from recent returns. Momentum investment or trend chasing is also corroborated by Bohn and Tesar (1996), Richards (2005), Froot et al (2001) and Griffin et al., (2004). Using data from U.S. Treasury, Bohn and Tesar (1996) claim that U.S. investors, rather than rebalancing their portfolio consistent with theory, tend to invest in equities exhibiting recent higher returns. Similarly, Kim and Wei (2002), using different categories of foreign portfolio investors in emerging markets, corroborates the positive feedback trading. They attribute differences in available information to the differences in trading behaviours. Using six Asian emerging markets, Richards (2005) documents strong contemporaneous relationship between equity returns and net inflows and

finds momentum trading behaviour with respect to recent return. Brennan and Cao (1997) argue that portfolio flows show linear relationship with local equity returns incorporating significant information to predict future returns. Froot et al., (2001) and Richards (2005) claim that cross-border flows of fund incorporate information about markets' fundamental prospects and aid in predicting long term future returns.

A number of studies have also looked at the impact of flows on equity price. Froot et al., (2001), Bekaert et al., (2002), and Richards (2005) have documented the price pressure hypothesis. These studies show that portfolio investments significantly increase the price of local markets. However, Bekaert and Harvey (2003) observe that studies disagree on whether the effect is temporary or permanent. If the increase in prices is temporary, it may just be reflection of "price pressure", which has also been documented in developed markets for mutual fund flows on stock indices (Shleifer, 1986 and Warther, 1995). However, if the price increase is permanent, it may reflect a long-lasting decrease in the cost of equity capital associated with the risk-sharing benefits of capital market openings. Bekaert et al., (2002) make such claim and show that increased valuation may be permanent indicating long term reduction in cost of capital.

1.4.3 Comovement and contagion

One of the other concerns of market integration is that it creates closeness of home markets, regionally and internationally. A major move in one market may affect other markets regardless of Errunza's (2001) argument that there are no strong theoretical reasons to believe that FPEI should lead to greater market comovements. However, in a globally integrated market, it is intuitive to believe that an event in one market could have impact on another market as both are exposed to same global risk factors. Errunza (2001) posits that such impact should be small and perfectly rational without any destabilising effect. Bekaert and Harvey (2003) argue that if increased integration may reduce expected returns, it may also increase stock market correlation reducing the potential diversification benefits.

Similarly, there is a debate on the contagion phenomenon, particularly, during bear markets. However, Stulz (1997) concludes: "if there is plenty of arbitrage capital, contagion should not be a problem." (p. 26).

1.5 Summary of hypotheses and findings

As noted above, the growth in foreign equity portfolio investment plays an important role in the development of local capital market. National policy makers would be interested in identifying the different factors foreign investors take into account in their country allocation decision. The knowledge and evidence of these different factors should guide national governments in creating friendly investment climate for foreign investors. Given the importance of foreign equity portfolio investment, policy makers would be interested in finding answer to the following question:

1. What determines the cross-country and temporal variation in worldwide foreign equity portfolio holdings?

Our first three empirical studies examine various hypotheses related to the above question. We propose a number of predetermined and novel variables and explain the variations in foreign equity portfolio holdings.

In our earlier discussion, we also noted that there is an extensive empirical debate on the destabilizing effect of foreign equity portfolio flows, particularly for emerging markets. The growth in foreign equity investments in emerging markets and the debate on the likely implications for their integration with the global equity markets has prompted intense research interest in this subject matter. The current credit crises caused by the high defaults in the U.S. sub-prime market and its spill-over effects to other economies in developed and developing part of the world have further highlighted the need to investigate the role of foreign institutional investors in emerging stock markets. Although there are a number of studies which provide evidence of increasing integration of emerging markets with the global markets (Syriopoulos, 2007; Chelley-Steeley, 2005 and Dungey et al., 2004), none have so far examined the role played by foreign investors on the long and short run linkages of emerging markets. In view of the global spread of current financial crisis and its likely implications for a number of emerging markets, it is both topical and desirable to understand the role and influence of foreign investors on the process of integration of emerging equity markets with the global markets. Our fourth

empirical study attempts to answer the following question:

2. What is the impact of foreign equity portfolio flows on global linkages of the Asian emerging markets?

In the following sections, we summarize the motivation of our study, and briefly report the findings of the hypotheses tested related to both the above questions.

1.5.1 Determinants of worldwide foreign equity portfolio holdings

Using Markowitz's (1952) portfolio optimization framework an extensive number of articles show that cross-country investment significantly improves the risk-return profile of domestic equity portfolios (see Grubel, 1968; Levy and Sarnat, 1970; Solnik, 1974; Grauer and Hakansson, 1987; Errunza, 1988 and DeSantis and Gerard, 1997). Although few studies (Jorion, 1985; Farragher and Hui, 1985 and Goetxmann et al., 2001) claim that the benefits of cross-country diversification may not be as strong as demonstrated by existing studies, majority of the studies generally corroborate diversification benefits. If investments in foreign equities span efficient frontier favourably then what is the optimal level of foreign portfolio equities that investors should hold in their domestic portfolio? The International Capital Asset Pricing Model (ICAPM) prescribes that every investor should hold the world market portfolio. However, a significant number of theoretical studies demonstrate that ICAPM may not hold in practice (Alder and Dumas, 1983; Solnik, 1974b; Cooper and Kaplanis, 1986, 1994 and Stulz, 2005). There are number of market frictions or barriers, such as real exchange rate risk, market efficiency, illiquidity, institutional risk, information asymmetry etc, which invalidates ICAPM and investors may therefore deviate from holding the world market portfolio. Most of the capital market equilibrium frameworks model the violation of unrealistic assumptions of ICAPM, i.e. markets are perfectly integrated, purchasing power parity holds, no transaction costs, and no barriers to international investments, in explaining the deviation of the holdings of foreign equities from the optimal as predicted by theory.

Our study uses the theoretical framework of Cooper and Kalpanis (1986) and tests several hypotheses. Cooper and Kalpanis (1986) show how the presence of deadweight costs arising

from frictions/barriers to international investments influence worldwide foreign equity portfolio allocation decision.

The empirical literature has extensively focused on investigating the phenomenon of home bias (tendency to overweight home markets contrary to ICAPM guidance), particularly from U.S. perspective. A long list of predetermined factors has been suggested explaining home bias, including information asymmetry, behavioural factors and institutional factors. However, only few studies (two to the best of our knowledge) have modelled the bilateral cross-country foreign equity portfolio holdings (FEPH) on a worldwide basis. Studies modelling FEPH are limited due to the lack of high quality and comprehensive bilateral cross-country equity holding data (Chan et. al., 2005). Our study makes use of the bilateral cross-country equity holding data recently made available by the Co-ordinated Portfolio Investment Survey (CPIS) of International Monetary Fund. We employ panel data set of 36 host countries with bilateral investments from 16 source countries for a period of 6 years (2001-2006). Extensive coverage of 36 countries with over 500 cross sectional units (over 3000 observations) enables us to undertake comprehensive and robust investigation.

Given the relatively fewer number of studies modelling FEPH, we make important contributions to the existing literature on international equity portfolio investment (see chapter 2, section 2.8 for details). Following theoretical and empirical literature, we construct an estimate of country level foreign equity portfolio allocation (FEPA – for details see section 2.1) and examine the role of different factors explaining cross sectional and temporal variation of FEPA. We test all our hypotheses using relatively more efficient *random effect* and more robust *fixed effect* panel data models.

The first sets of hypotheses we test examine the role of transaction cost on FEPA decisions (see chapter 6). We handpick data on three different components of transaction costs (commission, fees and market impact) from Standard and Poor (S&P) stock market fact books and test the following hypotheses:

H_1 Countries with lower level of average commission attract higher level of FEPA.

H_2 Countries with lower level of average fees attract higher level of FEPA.

H_3 Countries with lower level of average market impact cost attract higher level of FEPA.

This is the first study to test the individual and collective effects of each of the components of transaction costs on FEPA. Our study addresses a number of robustness issues, such as omitted variable bias, unit specific effect, reverse causality, free float home bias, major financial centres effect and between effect estimations. The results show significant influence of transaction cost with evidence of foreign investors underweighting countries with higher transaction costs.

The second set of hypotheses investigates the role of country specific equity market characteristics (CSEMC) explaining FEPA (see Chapter 7). We use five different variables to proxy for the effect of CSEMC, such as stock market development/size, market liquidity, emerging market dummy, equity return volatility and exchange rate volatility. We are first to use the two volatility measures (stock market volatility and exchange rate volatility) in modelling FEPA with strong theoretical arguments (see chapter 3, section 3.2.4 and 3.2.5). The following hypotheses are tested in the second empirical study:

H_4 Stock market development/size has positive influence on FEPA.

H_5 Foreign investors prefer to overweight markets with higher liquidity.

H_6 Foreign investors prefer to underweight emerging markets.

H_7 Foreign investors prefer to underweight markets with higher equity market volatility.

H_8 Foreign investors prefer to underweight markets with higher real exchange rate volatility.

In line with theoretical arguments, the results indicate that all the CSEMC factors have strong and statistically significant effect on the foreign equity portfolio allocation decisions.

Finally, our third set of hypotheses explores the relationship between investor protection and FEPA. Existing conclusions on the role of investor protection are controversial with contrasting views. Within the framework of panel data set and following Bekeart et al., (2007), we use ICRG's *investment profile* index to capture the features of investor protection risk specifically related to foreign investment. We also include ICRG's *quality of institution* index reflecting broad based measure of investor protection representing country specific regulatory environment. La Porta et al., (1997, 1999 and 2000) demonstrate that countries following English common law are better at instituting and enforcing investor protection rights. We use a dummy that takes value of one if a country follows English common law and zero otherwise. We test the following hypotheses in our third empirical study:

H_9 Higher levels of investor protection measures specifically related to foreign investment are associated with higher levels of FEPA.

H_{10} Higher levels of general investor protection measures are associated with higher levels of FEPA.

H_{11} Countries adopting English common law attracts higher levels of FEPA.

Our results show that *investment profile* and *Common English law dummy* are highly statistically significant across all regressions. However, *quality of institution* is not able to stand different robustness tests indicating foreign investors may not be interested in the broad based general investor protection right development index rather they are more concerned about the regulatory framework which directly affects their investments (see section 3.5 of chapter 3 for argument).

Drawing on the results of the first three empirical chapters, we conclude that CSEMC, including transaction cost and volatility measures, exert largest influence on foreign equity portfolio country allocation decision. All the CSEMC variables are statistically significant and bear the correct signs. Intuitively, foreign investors like to allocate higher fraction of their wealth in countries with larger equity market capitalization, with higher turnover ratio, with lower

transaction costs, lower equity and exchange rate volatility, and in non-emerging markets. Although relatively not as important as the CSEMC factors, an investment climate offering sound and cost efficient investor protection rights, particularly specific to foreign investments, also affects country allocation decision.

1.5.2 Impact of foreign equity portfolio flows on global financial linkages of Asian emerging market

Our fourth and final empirical study demonstrates the impact of foreign equity flows on global linkages of four Asian emerging markets. This study draws inspiration from two main strands of the literature. The first one deals with integration of emerging equity markets with the global equity markets by investigating the correlation structure and comovements in equity returns. The second deals with the dynamics of foreign investment flows and equity returns in emerging markets. We are the first to combine both the strands and provide comprehensive evidence on the long run equilibrium relationship and short run dynamics between flows, local equity market and global capital markets.

We use daily net foreign equity investment flows and stock index return available for four Asian emerging markets of India, Korea, Taiwan and Thailand for 2001-2007. Our study uses a number of variants of VEC model and tests the following hypotheses:

H_{12} Foreign equity portfolio flows drive the global integration of the Asian emerging markets with the global equity markets.

H_{13} Foreign investors are "return chasers", i.e., flows are caused by changes in expected returns (i.e. feedback hypothesis).

H_{14} Increase in foreign equity portfolio flows raises domestic stock market price (i.e. price pressure hypothesis).

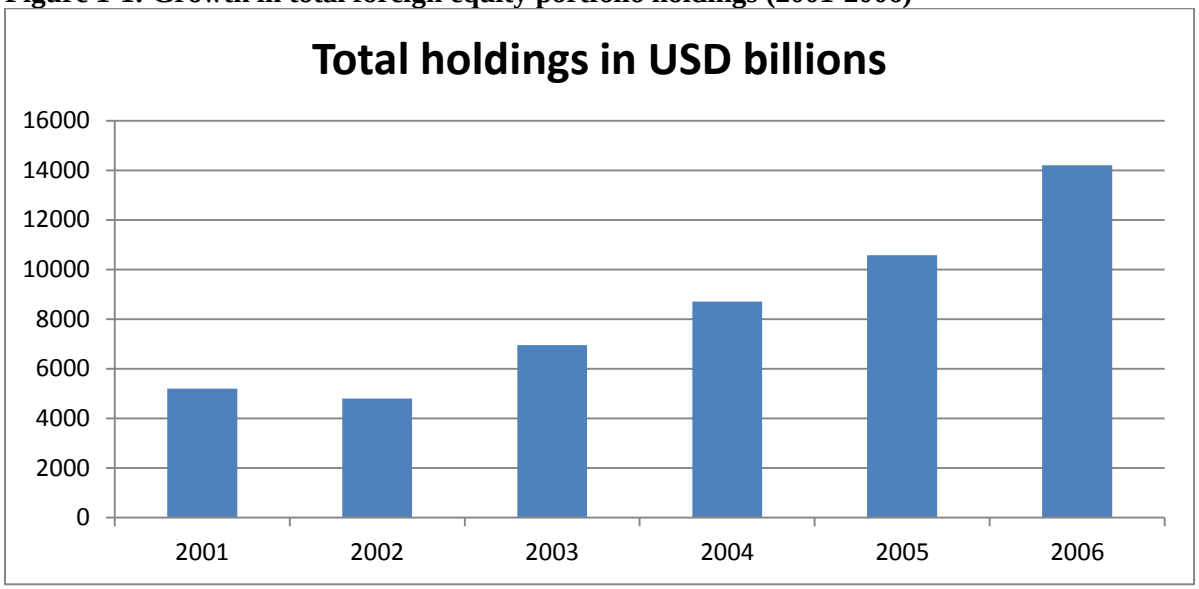
The findings suggest that greater integration of the Asian emerging markets with global equity markets appears to be affected by the increasing investments by foreign investors. The short-run

impact confirms that the global markets have a significant causal effect on equity returns of all four emerging markets. Most notable is the finding that foreign equity investment flows play a significant role in correcting the short-term deviations in the convergence process of Asian emerging equity markets with the global equity markets. The results are consistent with previous research. However, we find stronger evidence for positive feedback hypothesis for all four markets. Findings also support the widely held view that foreign investors are return chasers and their trading behaviour in emerging markets is highly influenced by recent returns. The results also confirm the price-pressure hypothesis suggesting foreign equity investors have significant role affecting stock market valuations in the Asian emerging markets. Conclusively our results indicates that the Asian emerging markets may become increasingly vulnerable to the shocks in the volume and pace of foreign equity investment flows and turn more volatile in future.

1.6 Structure of the thesis

The structured of the thesis as follows. The following chapter extensively discusses the theoretical and empirical literature on the determinants of foreign equity portfolio holdings. It motivates the rationale of our study in light of the identified gap and claims contribution to the literature. Third chapter develops the hypotheses tested in our four empirical studies. Chapters 4 and 5 discuss the data and methodology respectively. Chapters 6 - 9 present the empirical findings and chapter 10 concludes the study highlighting the limitations and issues for further research.

Figure 1-1: Growth in total foreign equity portfolio holdings (2001-2006)



Source: Co-ordinated Portfolio Investment Survey (International Monetary Fund)

Chapter 2 Theoretical and empirical literature

2.1 Introduction

From the discussion in previous chapter, it is evident that foreign equity portfolio plays important role in the development of domestic capital market whereas evidence on destabilizing effects is highly debatable. The interesting question to be asked is if foreign portfolio equity investments are important then every country should strive to attract foreign investors. We begin this section by analysing the foreign equity portfolio allocation computed using the data from IMF's *Coordinated Portfolio Investment Survey*, which reports cross-country bilateral equity portfolio stock holding data. Following Chan et al., (2005), the portfolio allocation (weights) from country *i* (called investor or source country) into country *j* (referred as host or destination country) for a particular year *t* is defined as

$$w_{ijt} = \frac{FEPH_{ijt}}{\sum_{j=1}^{36} FEPH_{ijt}}$$

where w_{ijt} is the *foreign equity portfolio allocation* (*FEPA*). $FEPH_{ijt}$ is foreign equity portfolio holdings from country *i* into country *j* for the year *t*. The bilateral data on the 36 host countries (*j*) is from International Monetary Fund (IMF). We compute the *average FEPA* received by the 36 host countries from 16 investor countries (*K*) using the following equation and the statistics are reported in Table 2-1.

$$Averge\ FEPA\ for\ each\ host\ country_j = \frac{1}{KT}\sum_{t=1}^{T}\sum_{i=1}^{K} w_{ijt}$$

For example, suppose investors from countries A and B (i.e. *K*=2, the investor countries *i*), invest USD 25 million each into equity issued by corporation domiciled in country C, D, E and F (i.e. host countries *j*), for a particular year. Hence, the total fund invested by A and B is 100 million each and the weight allocated over 4 host countries is 25% (25/100) each. Therefore, average

allocation received by host countries from A and B is 25% {(25%+25%)/2}. Also, suppose the allocation is same over six year period. This suggests that *average FEPA* received by each of the host country is 25% {(25%×6)/6}.

…..…….Insert Table 2-1 about here, see page 50……..

In our sample, the number of investor countries is 16 (Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, UK and U.S).

The number of host countries is 36 as shown in Table 2-1 above. It is clear that the top ten countries receiving highest foreign portfolio equity allocation from foreign investors are all developed countries. The countries that find themselves at bottom 10 are mostly emerging countries with the exception of New Zealand. This simple descriptive statistics leads us to the following general research question:

What factors explain the cross sectional and temporal variation of FEPA?

There is evidence that legal barriers to foreign investments are gradually being removed in emerging countries (Stulz, 2005). Furthermore, studies (Kohers et al., 2006) also demonstrate that emerging markets provide higher return and better diversification opportunities relative to developed markets. However, despite higher return and favourable diversification opportunities, why do investors still prefer developed markets in their country allocation? With the objective of seeking answers and identifying potential opportunities for further research, we explore the extant literature on international equity portfolio investment. The literature review will focus on the following three questions:

1. What are the theoretical motivations for investing in foreign equities?
2. What theories guide foreign investors for optimum foreign equity country allocation?
3. What are the existing empirical evidences on international portfolio allocation?

2.2 International portfolio diversification

2.2.1 Introduction

Harry Markowitz's (1952) pioneered the portfolio-optimizing model. He shows that by including assets that are less than perfectly positively correlated, the risk-return profile of a portfolio is improved. Further studies (Evans and Archer, 1968 and Wagner and Lau, 1971) also corroborate the diversification benefits of the portfolio-optimization model. Grubel (1968) argues that although the mean-variance optimization model is criticized by some studies (explained in the later section), their basic content has become economic orthodoxy in investment management industry. Grubel extents the model in context of claims denominated in foreign currency and analyses influence of diversification using equity market indexes of eleven countries. His findings demonstrate that a portfolio well diversified internationally dominated the U.S. index when measured in terms of ex-post returns and risk. Following Grubel's work an extensive number of studies (see Sarnat, 1970; Solnik, 1974a.b, Errunza, 1977, 1983 among others) confirm the advantage of holding foreign securities. Levy and Sarnat (1970) study equity market indexes of 28 countries for a period spanning 1951-1967. They report that investment in the U.S. and Japanese stocks make a substantial proportion of optimal portfolio, primarily because of negative correlations during the study period observed between equity markets of U.S and Japan. They further note that American investors can substantially improve their risk-return combination by including securities of foreign countries, such as Japan, South Africa and other developing markets of South America and Asia. We explore the technical details advocating case for international portfolio diversification in the following section.

2.2.2 The case for international portfolio investment

Among others, contribution of Bruno Solnik (1974a, 1977, 1982, 1995, 2004 and 2009) is considered substantial in the field of international investments. Solnik and McLeavey (2009) report that the practice of international portfolio investment long been custom in many European countries, but is a recent phenomenon in North America. They document that international portfolio diversification is growing among all countries and is now popular among U.S. institutional investors. Solnik and Mcleavey (2009) show that during early 1970s U.S. pension fund virtually held no foreign securities in their portfolio but by the year 2006, the percentage of foreign assets approached approximately 20% of the total assets. Similarly, during the same

period, British institutional investors held more than 25% of total assets in foreign securities and few Dutch firms held more than 50% of their assets invested abroad. Figure 2-1 shows the growth in world market capitalization for past twenty years. If we ignore peak of the global financial crisis year (2008), world market capitalization grew by a factor of almost 7. The share of U.S. was almost 28% at the beginning of 1989 peaking nearly 50% in 2001 and again dropping to 33% by end of 2008. Similarly, for U.K., the trend of their share in world market capitalization has also not been stable beginning with almost 8% in 1988 reaching highest point of nearly 9% in 2000 and dropping to 5% by end of 2008. Solnik and Mcleavey (2009) report that the mere size of foreign markets justifies international diversification, even for U.S. investors. They note that in a fully efficient and integrated global capital market, a passive investor should, in theory, (basic International Capital Asset Pricing Model, discussed in subsequent sections), hold the world market portfolio. For U.S. investors, as of end of the year 2008, almost 67% of their equity portfolio should be invested abroad and for U.K. this figure should be a staggering 95%. Even though it may be unrealistic to believe in a perfectly integrated and efficient world capital market, the case for international diversification is still strong as explained in the following paragraph.

……..Insert Figure 2-1 about here, see page 51……..

Further developing the work of Grubel (1968) and Levy and Sarnat (1970), Solnik (1974a) conjectures that the basic argument in favour of international diversification stems from the notion that foreign securities allow domestic investors to reduce the total risk of their portfolio and offer profit potential. The rationale for improvement in the risk-return profile is that domestic securities tend to co-move together because they are commonly affected by domestic conditions, such as monetary announcements, changes in interest rates, budget deficits, national growth and political events. This surely creates a positive correlation (even after removing the idiosyncratic risk after domestic diversifications) among almost all equities traded in the same national market. However, as highlighted earlier, low correlation among countries provide opportunity for a global investor to reduce risk via diversification, particularly for passive investor who wishes to mimic the world market portfolio. Solnik and McLeavey (2009) show that low correlation also provides profit opportunities for an active investor. As the low

correlation does not perfectly synchronize the movement of national markets, an expert investor can hope to adjust the international asset allocation of global portfolio toward markets with superior performance. This should generate better risk-adjusted expected return as discussed and shown in the model below.

2.2.3 Model of international risk diversification

The prime objective of risk diversification is to reduce the total risk of a portfolio. The reduction in risk should also be accompanied by highest possible expected return. Solnik and McLeavey (2009) claim that total risk of major international equity markets is greater than that of U.S market, when the dollar is used as the base currency. The increase in risk, in part, is caused by currency risk, which adds to the risk of foreign investment, even though volatility of different national markets, based in their home currency, may be comparable. However, they show that the risk of an internationally diversified portfolio could be reduced through lower correlations among equity markets. For example, let's consider a U.K. investor who partly invests in domestic assets (e.g. a UK stock index) and partly in foreign assets (e.g. a Brazilian stock index). The proportions invested in each asset class are denoted as w_d for domestic assets and w_f for foreign assets. R_d and R_f denotes return on domestic asset and foreign assets respectively with all returns denominated in base currency (i.e. the UK pound). The return on foreign assets is subject to change with movement in exchange rate also signifying exposure to foreign exchange risk. The standard deviations of returns on the domestic and foreign assets are σ_d and σ_f respectively with total risk being denoted by σ_p. The correlation between the two asset classes is $\rho_{d,f}$.

The covariance between two asset classes is given by

$$cov_{d,f} = \rho_{d,f}\sigma_d\sigma_f, \qquad 2\text{-}1$$

The expected return on the portfolio

$$E(R_p) = w_d E(R_d) + w_f E(R_f) \qquad 2\text{-}2$$

The well known portfolio risk formula given by Markowitz (1952) is

$$\sigma_p^2 = w_d^2\sigma_d^2 + w_f^2\sigma_f^2 + 2w_d w_f \rho_{d,f}\sigma_d\sigma_f \quad 2\text{-}3$$

The total risk or the standard deviation of the portfolio is thus equal to

$$\sigma_p = (w_d^2\sigma_d^2 + w_f^2\sigma_f^2 + 2w_d w_f \rho_{d,f}\sigma_d\sigma_f)^{1/2} \quad 2\text{-}4$$

The total risk of the portfolio will always be less than the average of both standard deviations, i.e. $w_d\sigma_d + w_f\sigma_f$, except for the case when correlation between two asset classes is exactly one. However, it is widely known that correlation is rarely perfectly synchronized and therefore there is always the possibility of reducing the risk through diversification.

Solnik (1974a) provides the empirical evidence, as shown in the Figure 2-2, that by adding securities in the portfolio of U.S. holdings, there is significant gain through reduction of risk. As shown in the figure, total risk for a portfolio consisting of U.S securities only accounts almost 21% which significantly reduces to almost 12% when securities from other countries are added to the portfolio. With portfolio of U.S. stock only, the risk reduces as the number of securities increase but it peaks almost 21% with almost 30 securities and does not improves the risk with further addition. However, when international securities are added, the total risk drops to 12%.

……..Insert Figure 2-2 about here, see page 51……..

2.2.4 Foreign exchange risk consideration

When domestic portfolio consists of foreign asset, the return on the portfolio depends on the currency used. For example, the total return for the U.K. investor will be different if the portfolio is denominated in GBP or in Brazilian real. The pound value of the asset is equal to its Brazilian Real value scaled by exchange rate (i.e. number of GBP per Brazilian Real) as shown below.

$V^{£} = V \times S$

where V and $V^{£}$ are, respectively, the values in Brazlian currency (i.e. local currency) and in GBP pounds and S is the exchange rate (number of GBP per Brazilian Real). The return which the UK investor earns for a single time period i.e. from time 0 to time 1 is equal to

$$r^{£} = \frac{V_1^{£} - V_0^{£}}{V_0^{£}} = \frac{V_1 S_1 - V_0 S_0}{V_0 S_0} = \frac{V_1 - V_0}{V_0} + \frac{S_1 - S_0}{S_0} + \frac{V_1 - V_0}{V_0} \times \frac{S_1 - S_0}{S_0}$$

$$r^{£} = r + s + (r \times s) \qquad 2\text{-}5$$

where $r^{£}$ is the return in GBP, r is the return in local currency (i.e. Brazilian Real) , and s is the percentage exchange rate movement[3]. In order to simplify notations, it is usually assumed that the cross product $r \times s$ is small relative to r and s and therefore Solnik and Mcleavey (2009) suggests that it can be ignored. This implies that the variance of GBP return is simply sum of the variance of local currency return (Brazilian Real) and return on exchange rate.

$$var(r^{£}) = var(r + s) = var(r) + var(s) + 2cov(r, s) \qquad 2\text{-}6$$

or

$$\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s \qquad 2\text{-}7$$

where σ_f^2 is the variance of the foreign asset measured in GBP, σ^2 is the variance in local currency (Brazilian Real) and σ_s^2 is the variance of exchange rate (number of GBP per Brazilian Real). ρ is correlation between asset return in local currency and movement in exchange rate. As we know that correlation coefficient never exceeds 1, asset and exchange rate risk are never additive. As a result, we have

$\sigma_f \leq \sigma + \sigma_s$

[3] If a dividend or coupon is paid in period 1, it will be included in V_1.

The difference between σ_f and σ is the contribution of the currency risk. As demonstrated in the figure below, Solnik (1974a) shows the effect of exchange risk in a portfolio. The portfolio in the figure below is constructed assuming returns in dollar at each point in time. Three portfolios are shown. First, a portfolio of U.S stock only, second is the portfolio of U.S and other international stocks but assuming no protection against exchange rate risk and third for an exchange risk covered (hedged) portfolio. As expected, the risk of the portfolio unprotected against movement in exchange risk is larger than for a covered portfolio. However, even if the risk is not covered, the total risk of the internationally diversified portfolio is much lower than the domestic portfolio.

……..Insert Figure 2-3 about here, see page 52……..

The theoretical discussion clearly advocates the case for international portfolio diversification. As noted earlier, there has been extensive research advocating the case for international diversifications. Grauer and Hakansson (1986) applies mean-variance model to a global environment by incorporating four principal U.S. asset categories and up to fourteen non-U.S. equity and bond categories in their portfolio. They find significant gains by including non-U.S. asset classes. Errunza (1977 and 1983) examines the effects of adding emerging markets as asset class and demonstrates that internationally diversified portfolio produce better risk-return profile than purely investing in the U.S. stock index. However, there are studies, as discussed below, that question the empirical validity of the findings supporting international diversifications.

2.3 The Case against international portfolio diversification

Although there are considerable evidence on benefits of international diversification, a number of studies claim that evidence in the literature overstate potential benefits of international diversification. Jorion (1985) claims that the models favouring international portfolio diversification do not consider estimation risk, particularly the difference between ex-post and ex-ante mean returns. Similarly, there is evidence on the increasing or unstable correlation among the world equity markets (Watson, 1980; Shaked, 1985 and Goetzman et al., 2005) and

finally there are barriers/costs associated with international investment reducing the benefits of diversification (de Roon et al., 2001 and Solnik and Mcleavey, 2009).

2.3.1 Estimation risk

In almost all studies advocating benefits of international portfolio diversification, ex-post exercises are used to yield result of portfolio optimality. However, Solnik and McLeavey (2009) note that portfolio management need to be forward looking. A prudent asset allocation strategy should be based on credible market forecast, not on ex-post returns. Jorion (1985) criticizes most of the works favouring international portfolio diversification as a means of enhancing average returns with reducing portfolio risk. He argues that the claim of improving risk-return profile relies on the assumption that required inputs to the classical mean-variance analysis are known with certainty. In classical optimization problem, expected returns, variances and co-variance of returns are simply substituted by their ex-post sample values and optimal portfolio is then derived without taking account of the uncertainty in estimation of input parameters. Jorion (1985) asserts that investors should take uncertainty of the estimations in their model when forming expectations and should consider estimators that are less subject to estimation error than the classical sample mean. He uses studies of Grubel (1968) and Levy and Sarnat (1970) to demonstrate that most serious defect of classical approach is poor and unstable result of the out-of-sample performance of optimal portfolios. The performance measures (i.e. the risk and return measures) deteriorate substantially outside the sample period. Another major problem detected is the instability of optimal portfolio. Each portion added to the portfolio are extremely sensitive to fluctuations in expected return, and just by augmenting few extra observation the distribution of optimal portfolio is completed altered. Jorion concludes that estimation risk due to uncertain mean returns has significant effect on optimal portfolio selection and therefore alternative measures (see Jorion, 1985 for the measures) should be considered. However, the variance and co-variances in most of the studies are measured with good precision. He concludes that there are pitfalls of analyzing portfolio diversification in a mean-variance framework based on ex-post data and most of the studies overstate the extent of potential gains in average returns. He suggests that benefits of diversifications are more like to occur by reduction in risk rather than enhancement in expected returns.

Although Jorion (1985) challenges the result of international portfolio diversification on the grounds of estimation risk, Eun and Resnick (1988) show that even after incorporating the estimation and exchange rate risk, international diversification strategies significantly outperform the risk-return profile of domestic portfolio, even in out of sample periods.

2.3.2 Increase in correlation

The increase in correlation between equity markets is also considered as a case against international portfolio diversification. The prime benefit of diversification is risk reduction because of differing correlation between equity markets. However, Solnik and McLeavey (2009) claim that international correlation has in fact trended upward over the past decade. They demonstrate that the correlation of U.S and other major developed stock markets have been trending upward since 1975. Similarly, studies also show that international correlations increase during periods of high volatility. For example, Goetzmann, Li and Rouwenhorst (2002) investigate the correlation structure of major world equity markets (France, Germany, United Kingdom and United States) from late nineteenth century (1870) until end of 2000 and report that correlations significantly vary through time. They show significant increase in correlation during late nineteenth century, during the Great Depression, and the late twentieth century.

A number of studies show that emerging equity markets are also showing signs of greater financial integration with the developed markets (see, Jong and Roon, 2005). Phylaktis (1999) examines the extent of capital market integration for a group of Pacific Basin countries and finds they are highly integrated with the world financial markets. In a latest study, Tai (2007) examines Asian emerging market data and concludes that over time, since the markets were liberalized, they exhibit greater integration with world capital markets.

Although most of the above studies suggest that correlations have increased over time, especially during period of high volatility, many authors ague that the correlation coefficient estimates used in many studies suffers from biased sampling error (see Gibson and Boyer, 1998; Loretan and English, 2000; and Forbes and Rigobon, 2002). Loretan and English (2000) propose the use of a correct statistical procedure to study correlation of equities, bonds and foreign exchange incorporating various periods of market turbulence. Similarly, Forbes and Rigobon (2002) also

examine numerous crises periods, including the October 1987 crash and conclude that the tests based on correlation measures are inadequate and problematic being victim of bias introduced by persistent volatility in market returns (i.e. hetoroskedascity). After proposing an adjustment to hetoroskedascity, they show that correlation does not increase significantly in periods of crisis. Similarly, Longin and Solnik (2001) note that correlations measures are stable in the presence of large positive shocks (i.e. bull market) but do tend to show upward trend in presence of large negative shocks. They claim that although there is some evidence that correlation increases during distress period but the rise is not as strong as suggested by some practitioners, at least not significant enough to reduce the risk reduction benefits of international diversification. Similarly, Ang and Bekaert (2002) incorporate different correlations regimes (normal and volatile) in their asset allocation model and show that the presence of increased correlation during the bear markets makes a much smaller negative influence on the optimal global asset allocation.

2.3.3 Barriers to international investment

Although many studies build strong case for international diversification, Solnik and McLeavey (2009) claim that investors do not allocate their wealth following the suggestion of ICAPM. They suggest that the conservative investment behaviour of under allocating foreign markets may be explained by the prevalence of potential barriers to foreign investment such as familiarity with foreign markets, market efficiency, regulation, transaction costs, taxes and currency risk. In fact, these barriers are the suspected sources of frictions explaining why ICAPM may not hold in practice as discussed below.

2.4 Domestic CAPM in international setting

As discussed above, there is significant evidence that by including foreign assets, investors can significantly improve their risk-return profile. Based on the extension of Markowitz (1952) portfolio theory, Sharpe (1964), Lintner (1965) and Mossin (1966) developed the Capital Asset Pricing Model (CAPM). The domestic version of CAPM is extended to include foreign portfolio investment and is termed as International Asset Pricing Model (ICAPM). The initial version of the ICAPM is based on number of assumptions, such as:

1. Investors throughout the world have identical consumption baskets.
2. Different currencies have no significant implications for portfolio choice and asset pricing, i.e. real prices are identical in all countries. This implies that the purchasing power parity relationship holds at every point in time and the exchange rates simply mirror differences in their inflation rate.
3. Capital markets are perfect across the world, i.e. world capital market efficiency holds and markets are fully integrated.
4. There are no withholding taxes, no information asymmetries, no restrictions on short selling, no transaction costs and no other barriers to international capital flows.
5. Investors are identical with respect to risk aversion and information.
6. Investment and opportunity sets are same across countries.

Similar to the domestic CAPM, the ICAPM assumes that all investors determine their demand for each risky asset by using the Markowitz (1952) mean-variance optimization (expected-utility maximization) in domestic currency. The demand from each of the investors across the world is aggregated and equated with the aggregate supply of the assets (their market capitalization). The net supply of the risk free assets (i.e. borrowing and lending) in each currency is assumed to be zero.

If the above assumptions hold, the ICAPM has a very simple implication for all investors across the globe: all investors must hold the world market portfolio regardless of their country of residence *i*. Consequently, it follows that portfolio share of country *i* invested into country *j*, for time *t*, W^*_{ijt} should be

$$W^*_{ijt} = \frac{MCAP_{j,t}}{MCAP_{world,t}}, \forall_i, \qquad 2\text{-}8$$

where $MCAP_{j,t}$ is the market capitalization of country j for the period t and $MCAP_{world,t}$ world market capitalization for period *t*. The market portfolio share is the benchmark share for all investors for country *j*. If the ICAPM prevails, all investors should hold the world market portfolio. Does this theory hold? In light of extant theoretical and empirical studies, many show that the above relationship is far from reality and foreign investors' deviate from the optimal

allocation. A number of theoretical studies, as discussed in the following section, show the implications of portfolio allocation when the restrictive assumptions of basic ICAPM are relaxed.

2.5 Inadequacy of domestic CAPM in international framework

Cooper and Kaplanis (1986) state that the domestic CAPM cannot be imposed in the international context by simply extending the opportunity set to incorporate the world market portfolio. International capital markets differ significantly from the domestic capital markets in many important aspects, such as different currency areas, different social-economic systems and extensive barriers to capital flows. As discussed in the following section, many studies incorporate such complexities of international capital markets in the theoretical development of international equilibrium models. Most of these models consider exchange rate risk as one of the key factors causing foreign equity country allocation to differ from the theoretical prescription of ICAPM. Similarly, these models also relax most of the other restrictive assumptions of ICAPM.

2.5.1 Purchasing power relationships and exchange rate risk

Zimmermann et al., (2003) note that the extension of international asset pricing models (single-beta ICAPM, APT and multi-beta ICAPM) are based on restrictive assumptions, as mentioned preceding section. However, country-specific consumption and investment opportunities imply that foreign investors from different countries perceive the returns on assets differently. This heterogeneity in expected returns and risk on the same asset arises primarily due to deviation from purchasing power parity (PPP) theory between countries. Grauer, Litzenberger and Stehle (1976) assume that the prevalence of exchange rate risk in the international portfolio is due to different stochastic national inflations, whereas on the other hand Solnik (1974b), Sercu (1980) and Adler and Dumas (1983) assumes that exchange rate risk originate from differences in consumption baskets between investors of different origin. In the following sections, we briefly explore the concept of PPP.

The basic concept of purchasing power parity is attributed to the contribution of Cassel (1916). Adler and Dumas (1983) claim that PPP simply measures similarity of consumption

opportunities in different countries. Stulz (1981a) defines the consumption opportunity set of an investor as "… the set of goods available for his consumption, the current prices, and the distribution of the future prices of those good …" (p.384). This implies that the primary causes of PPP deviations are differences in composition of national consumption baskets, relative prices of goods prevailing in different countries, and time-evolution of those prices. Stulz (1984a) corroborates that consumption baskets and investment opportunity sets of investors matter when one applies capital asset pricing models in an international context. The core fact that countries differ is shown to affect the portfolio held by investors, the equilibrium expected returns of risky assets and financial policies of firms.

Two different versions of PPP are reported in the literature: absolute PPP (APP) and relative PPP. Absolute PPP suggests that the exchange rate between two countries should equate to the ratio of average price levels in the two countries. This implies that at any point of time the following relationship should hold:

$$\sum_{g=1}^{G^d} w_g^d . P_g^d = S_f^d . \sum_{g=1}^{G^f} w_g^f . P_g^f \qquad 2\text{-}9$$

Where P_g^d denotes the price of the gth good in domestic country, and w_g^d stands for the weight of that good in domestic consumption basket. P_g^f and w_g^f are the gth good's price and its weight in the foreign country, respectively. G^d is the number of domestic goods, and G^f is the number of foreign goods in the foreign country. Finally, S_f^d is the spot price of the foreign currency in direct form, i.e., number of domestic currency for unit foreign currency. Equation 2-9 shows the relationship between average price levels. This relationship of absolute PPP must be distinguished from Commodity Price Parity (CPP), also known as the "law of one price." CPP states that the real price of any good should be the same irrespective of the country. This implies that any good g available in domestic and foreign country should have the following pricing relationship:

$$P_s^d = S_f^d . P_g^f \qquad 2\text{-}10$$

CPP is thus a concept in which an instantaneous arbitrage condition should hold in the absence of trade barriers between the two countries. This relationship generally holds for homogenous goods traded on organized auction markets, such as commodities exchanges. Good examples are gold and other precious metals. Equation 2-9 shows an average version of the CPP. PPP can be violated between two countries even though CPP holds for each individual good. In such circumstances, the weighting schemes in the national consumption baskets differ. Such differences occur because of the heterogeneity of national consumption tastes. Alder and Dumas (1983) remark that violation of CPP is rule rather than exception implying there may be two sources of PPP – differences in the national consumption basket and deviations from CPP.

If APP and CPP focus on national consumption basket and law of one price respectively, relative PPP emphasizes on the relationship between differential inflation rates and changes in exchange rate between the pair countries over a certain period. The rate of inflation in a country is generally computed on the basis of changes observed over consumer price index (CPI). The CPI is a price of representative goods in the consumption basket of a country. Theoretically, the CPI should measure consumption opportunities and preferences of all citizens in a country. The rate of inflation is then computed by measuring the changes in the CPI over the relevant time period. Relative purchasing power parity (PPP) implies that the inflation differential between the two pair countries should be exactly compensated by respective movements in the changes of spot exchange rate between the two countries' currencies. If we use the CPIs of the pair countries as a valid representation of price levels and take the ratio of the absolute PPP at the beginning and end of the period, we should end up with the following representation of relative PPP:

$$s_f^d = \frac{S_{f,t}^d}{S_{f,t-1}^d} = \frac{1 + \pi_t^d}{1 + \pi_t^f}$$

Where $S_{f,t}^d$ is the spot exchange rate at time *t* (at the end of period *t*), and $S_{f,t-1}^d$ is the spot exchange rate at time *t*-1 (at the beginning of period t). π_t^d represents domestic inflation rate for

period *t* and π_t^f denote the foreign inflation rate for the same time period respectively. The above relationship suggests that if PPP holds, changes in exchange rate merely mirror the inflation differential, which means that it should not affect the valuation of financial assets in real terms.

Solnik and McLeavey (2004) note that deviation from purchasing power parity could be a major source of exchange rate risk and consumption preferences can differ among countries. In such a case, the risk that the real prices of consumption good may not be identical in all the countries is referred as *real foreign currency risk, real exchange risk, or purchasing power risk*. Theoretically, if the Purchasing Power Parity (PPP) relationship holds then there should not be any risk to foreign investors arising from exchange rate changes as they will merely reflect inflation differentials (Solnik, 1974b). Solnik and Mcleavey (2009) show the following PPP relationship

$$x = s - (I_{DC} - I_{FC})$$

where *x* and *s* are the percentage movement in the real and nominal exchange rates and I_{DC} and I_{FC} the inflation rates in domestic and foreign countries. For example, let's assume that the yearly inflation rate is 1% in USA (domestic country) and 0% in Germany (foreign country). In order to ensure that there is no uncertainty arising from foreign exchange risk, the Euro must appreciate by 1% (x = 0%, s = 1%). Hence, we see that even if there is a change of 1% in exchange rate, there is no real effect on the return of investor due to exchange rate movement because this movement is adjusted by inflation rate differential. It's only when the Euro changes by more or less than 1%, the investor faces uncertainty over exchange rate and therefore uncertainty on their portfolio return due to exchange rate risk. This demonstrates that if PPP holds, the real exchange rate risk is constant (x = 0). However, we know that PPP does not always hold, at least not in the short run and therefore investor faces exchange rate risks which are not explained by inflation rate differentials between two countries (see Solnik, 1974b; Sercu, 1980 and Adler and Dumas, 1983, Stulz, 1984 and Carrieri et al., 2006).

Solnik and Mcleavey further stress that in practice; exchange rate movements are volatile and therefore cannot simply be explained by an adjustment to inflation. As inflation rates are

relatively stable compared to movements in nominal exchange rate, at least in the short run, investors do face exchange rate risk. However, if investors are able to hedge the potential exchange rate risk, then the domestic CAPM still holds in the international context. However, investors need to pay premium for hedging exchange rate risk. This suggests that exchange rate risk could be an important component in determining expected return and should be a priced factor. We further discuss the issue of exchange rate volatility in chapter 3 section 3.3.5.

The above discussion suggests that investors, irrespective of their origins, should hold the world market portfolio, provided they completely hedge their exchange rate risk.

2.5.2 International capital market efficiency and market segmentation

The concept of efficient market is central to finance theory. In an informationally efficient market, any new information should be immediately and fully impounded in the price of a security. As mentioned above, the general consensus of ICAPM theory is that individual markets across the globe are efficient, most probably due to intense competition among professional security analysts and managers in each of the individual national markets. However, the degree of efficiency differs from country to country, depending on the maturity, liquidity, size and level of regulation. The efficient market hypothesis, if it holds, implies that, on average, it is not possible to "beat" the market portfolio in any market and therefore the ICAPM should be a useful guide in investment policy. Although the national markets may be quite efficient, the efficiency of international markets remains debatable. This raises the question: can investors exploit international market inefficiency by active country allocation? Solnik and McLeavey (2009) claim that there is less analyst competition across countries than within a single domestic market. The issue of world market efficiency is based on the level of market integration and segmentation. In an integrated world market, investors should be able to take advantage of international inefficiency by moving capital across the world on the basis of new information. However, the debate whether market is integrated or segmented involves two concepts related to impediments to capital mobility and international asset pricing.

Many authors (Errunza and Losq, 1985, 1989; Eun and Janakiramanan, 1986; Hietala, 1989; and Errunza et. al., 1992) claim that international capital markets are not fully integrated because of

various investment barriers. Barriers, which impede the flow of capital, may be psychological caused by informational asymmetry, legal restrictions, higher transaction costs, discriminatory taxation, higher political and foreign exchange risks (see Cooper and Kalpanis, 1986, Harvey, 1995, Gelos and Wei, 2005 and Chan et al, 2005). Such barriers tend to restrict or limit the mobility of cross-country investment and segment national markets. Similarly, Bekeart and Hodrick (2009) also argue that investment barriers segment national markets from the global capital markets. Bekaert (1995) and Nishiotis (2004) classify investment barriers into "direct" and "indirect" barriers. The direct barriers comprise regulatory restrictions arising from foreign exchange control, foreign ownership restrictions, discriminatory taxes and higher trading costs (stamp duty). For example, during 1990s, the Korean authorities imposed restriction on foreign ownership up to 10% of the total market capitalization. Similar restrictions still exist in countries like India and China. The indirect barriers may arise from market specific risks such as poor information disclosure and weak investor protection.

Solnik and Mcleavey (2009) report that direct and indirect barriers are more severe in emerging markets. Some authors (see Cooper and Kaplanis, 1986 and Zimmermann et al., 2003) model the ICAPM taking account of barriers to cross border investments referring to them as potential tax on foreign investment. Black (1974) also notes that such tax arises from various kinds of direct and indirect barriers to international investment, such as the possible expropriation of foreign holdings (investor protection or political risk), direct control on the import and export of capital, information asymmetries and restriction on the fraction of a business that can be foreign owned. Furthermore, Cooper and Lessard (1981) also develop an international capital market equilibrium model incorporating different types of barriers to international investment.

Similarly, impediments to capital flows also affect asset pricing. If financial markets are fully integrated, then securities with identical risk characteristics, but listed in two different markets, should have identical expected returns and priced identically. A company located in a country, which is not fully integrated with the world capital markets, faces a higher cost of capital because the firm's equity risk is borne by the domestic investors only. If the firm makes it less costly for foreign investors to hold its shares, the investors' risk is dispersed and therefore the cost of capital falls. If markets are segmented, the same security with identical risk features may

have different expected returns and priced differently. The presence of restrictions imposes additional costs and risks to foreign investments causing market segmentation and thus affecting asset pricing. International asset pricing under different forms of market segmentation has been studied and more complex asset pricing models have been developed (see Black, 1974; Stapleton and subrahmanyam, 1977; Solnik, 1977; Stulz, 1981b; Errunza and Losq, 1985, 1989; Eun and Janakiramanan, 1986 and Hietala, 1989; Errunza et. al., 1992).

The above discussion suggests that in a complex world capital markets where direct and indirect barriers to capital flows are still in place, particularly for emerging markets, it is intuitive to believe that ICAPM may not hold in practice. Cooper and Kaplanis (1986) notes that casual empiricism conflicts strongly with the implications of existing ICAPM models and even with hedging of exchange rate risk, these models are unable to explain why, relative to world market portfolio, global investors' portfolio have a large bias towards domestic risky assets. Similarly, the models also fail to explain why investors discriminate between countries preferring to overweight some countries and underweight others. Cooper and Kalpanis (1986) provide an excellent framework modelling the portfolio equity allocation with different deadweight costs arising from direct and indirect barriers to foreign equity portfolio investments. As shown in the following section, they show why the foreign equity portfolio allocation may not be consistent with the suggestion of ICAPM.

2.5.3 Investment barriers/market frictions and Cooper and Kaplanis framework

Our study uses the theoretical framework of Cooper and Kaplanis (1986), which suggests that in the presence of deadweight costs foreign investors do not hold the world market portfolio as implied by the international equilibrium setting, i.e. the ICAPM. Their framework links foreign equity portfolio allocation (weights) to the deadweight costs arising from different barriers/market frictions to foreign equity portfolio investments. These barriers include transaction costs, taxation, capital control and so on. We briefly discuss their model here. For elaboration and further technical details please refer Cooper and Kaplanis (1986).

Within the framework of Cooper and Kaplanis (1986), each investor is assumed to be mean-variance risk-averter investor. The objective of such investor is to maximize return for a given level of variance. Let's consider an investor *i* with the following optimization function:

$$Max(x_i'R - x_i'c_i), \qquad 2\text{-}11$$

subject to

$x_i'Vx_i = v$

$x_i'I = 1$

where x_i is a column vector of weights containing foreign portfolio weightings, the *n*th element (x_{in}) corresponds to weight of individual *i*'s total wealth invested in risky assets of country *n*. *R* denotes the column vector of pre-tax expected returns and c_i is the column vector of deadweight cost of investor *i*. The *n*th element of c_i is c_{in} which is the deadweight cost for holding the asset in country *n*. *V* is the variance/covariance matrix of the gross (pre-cost, pre-tax) returns on the risky assets. v is the given constant variance and *I* is a unity column vector. Now the objective of the investor is to optimize equation 2-11 given the two constrains. Equation 2-11 can be maximized using the Lagrange method. The corresponding Lagrangean is

$$L = (x_i'R - x_i'c_i) - (h/2)(x_i'Vx_i - v) - k_i(x_i'I - 1) \qquad 2\text{-}12$$

where h and k_i are the Lagrange multipliers. In order to maximize the objective function (equation 2-11), we need to set its derivative to zero and solve it to produce

$$R - c_i - hVx_i - k_iI = 0 \qquad 2\text{-}13$$

or

$$x_i = (V^{-1}/h)(R - c_i - k_iI), \qquad 2\text{-}14$$

where

$k_i = [I'V^{-1}R - I'V^{-1}c_i - h]/I'V^{-1}I.$

Investors should hold the two funds in the absence of any barriers, the world market portfolio and the minimum variance zero beta portfolio. Additionally, they hold a fund specific to individual investor preference, which is the portfolio with the minimum variance for a specified level of deadweight cost.

Now that the individual weights are determined, the latter can be aggregated to end up with world capital market equilibrium. Therefore the market clearing condition is

$$\sum W_i x_i = M, \qquad 2\text{-}15$$

where W*i* is the proportion of world wealth owned by country *i*, *M* is a column with the corresponding *i*th element of which is *Mi* and is the proportion of the world market capitalization in country *i*'s market. Substituting equation 2-14 in equation 2-15 the resultant is

$$R - \sum W_i c_i - \sum W_i k_i I = hVM \qquad 2\text{-}16$$

and subtracting equation 2-16 from equation 2-13 we eliminate R.

$$hV(x_i - M) = (\sum W_i c_i - c_i) + I(\sum W_i k_i - k_i) \qquad 2\text{-}17$$

But

$$\sum W_i k_i \quad - k_i = z'(c_i - \sum W_i c_i) \qquad 2\text{-}18$$

where

$$z = V^{-1}I/I'V^{-1}I \qquad 2\text{-}19$$

and is defined as the global minimum variance portfolio. Substituting equation 2-18 in equation 2-17 we obtain

$$hV(x_i - M) = (\sum W_i c_i - c_i) - z'(\sum W_i c_i - c_i)I \qquad 2\text{-}20$$

If there are no barriers to investors for investing in foreign or in home country, then the deadweight costs (c_{in}) are zero. In such a case, the right hand side of 2-20 is zero implying that all investors should hold the world market portfolio. Consider a case where the covariance matrix, *V*, is diagonal with all variances equal to s^2 and the deadweight cost of any country/investor pair is denoted by *c*, except for domestic country that is equal to zero. In such case, the portfolio holdings of investor *i* in country *n* is:

$$x_{in} = M_n - (W_n c/hs^2), \qquad i \neq n \qquad 2\text{-}21$$

Equation 2-21 shows that larger the marginal deadweight cost, *c*, greater should be the deviation of portfolio holdings from the world market portfolio. The above relationship also implies that if the cost *c* of country A is higher than country B, country A will be more underweighted relative to world market portfolio than country B.

2.6 Empirical evidence

Most of aforementioned frameworks show why actual foreign equity portfolio holdings may deviate from the world market portfolio as predicted by ICAPM. We discussed the theoretical models that incorporate market frictions (deadweight costs) arising from different direct and indirect barriers to foreign investments. These frictions are generally violation of the assumptions made in ICAPM, i.e. the presence of exchange rate risk, the inefficiency of world financial markets and complete integration and the presence of barriers to international investments. Stulz (2005) argues that with dramatic increase in cross-border securities trading and the removal of formal barriers to international investment, the country-specific characteristics effects should matter less. However, this is far from reality because country specific barriers to foreign investments and the associated potential risks still remain very important. The empirical evidence suggests the country specific features matter for portfolio

choice. Chan et al., (2005) claim that the unavailability of high quality bilateral cross-border equity portfolio investment data has limited the number of empirical studies in international equity portfolio investment. Most of the studies have focused on the U.S. cross border investments as data on other countries are not available. On the empirical front, there have been several issues studied with majority focusing on home bias as discussed below.

2.6.1 Home bias and investment barriers

Our study does not model home bias measure rather it investigates allocation of bilateral portfolio holdings. However, the survey of home bias literature and possible factors explaining it is important in identifying sources that could possibly explain FEPA. ICAPM predicts that each investor country should hold the world market portfolio of risk assets. However, it is well known that investors, on aggregate, underweight foreign equities and overweight their home equities, a phenomenon inconsistent with the suggestions of ICAPM (see French and Poterba, 1999; Cooper and Kaplanis, 1994; Tesar and Werner, 1995, Lewis, 1999, Ahearne et al, 2004, Chan et al., 2005 and Fidora et al. 2007). This phenomenon is commonly known as *home bias*, which suggests that investors are irrational because they shun the potential gains of an internationally diversified portfolio. Most of the studies focus on U.S. market and examine the sources of US investor's home bias (for a good survey, please see Lewis, 1999). Home bias is defined as

$$\text{Home bias} = 1 - \frac{Share\ of\ foreign\ equities\ in\ local\ portfolio}{Share\ of\ foreign\ equity\ in\ World\ Portfolio}$$

Cooper and Kaplanis (1994) and French and Porterba (1991) document that on average the portfolio of US investors show a high level of home bias towards their domestic security, relative to the world market portfolio. Cooper and Kaplanis (1994) report that in 1991, U.S. investors held 98% of their portfolios in domestic securities while their market capitalization had a share of 36% in the world market portfolio. Ahearne et al. (2004) show that home bias of US investor is decreasing over time (see Figure 2-4 below) but it is still far from the level of allocation suggested by ICAPM.

……Insert Figure 2-4, see page 52 ...……..

The earlier studies on home bias offers three key but conflicting factors to explain home bias. First being the need to hedge domestic inflation. Several earlier works (Solnik, 1974b; Sercu, 1980; Stulz, 1981b, 1983; and Alder and Dumas, 1983) have developed models to investigate whether relatively larger demand for domestic assets stems from the need to hedge against domestic inflation. All these models predict that as fraction of domestic goods in total consumption increases, or as the risk aversion increases, the demand for local securities, in contrast to international securities, also increases. In other words, domestic assets seems to provide a good hedge against the deviation of PPP, However, Uppal (1993) develops a home bias model which suggests that it is unlikely that bias towards home is explained by consumption toward domestic goods and therefore home bias may not be the consequence of demand for hedging domestic inflation. Similarly, Cooper and Kaplanis (1994) using U.S. data provide empirical evidence in rejecting the hedging motive as an explanation of equity home bias. In a recent study, Giofre (2009) also rejects the domestic inflation-hedging hypothesis.

Another explanation documented by earlier studies is based on institutional barriers to foreign investments, such as the limit on level of ownerships. Kohers et al., (2006) suggest that the equity returns in developing markets demonstrate relatively lower correlation with the returns of developed market and thus provide better diversification opportunities. However, Errunza (1983) notes that the developing markets, which are more attractive to invest from diversification point of view, are also the most difficult markets to invest because of severe restrictions on foreign investments. As such, restriction on inward foreign investment could be the potential cause for the prevalence of home bias. Similarly, in a recent study, Chan et al., (2009) show that because there are restrictions on foreign inward portfolio investments in emerging markets, no significant diversification could be achieved unless, on average, 20% of the minimum market float is freely allowed to foreign investors. However, contradicting the above studies, the third set of factors presented in the literature is based on the theoretical models of international capital market equilibrium models discussed above. Studies (Black, 1974; Stulz, 1981b, Cooper and Kaplanis, 1986, 1994 and French and Porterba, 1991) suggest that despite the removal of formal restrictions, the existence of taxes in the form of various costs of investing abroad are the potential factors leading to home bias.

Further, a number of studies (see Zou, 1998; Kang and Stulz, 1997; Baxter and Jermann, 1997) have documented the role of information asymmetry in explaining home bias. Brennan and Cao (1997) develop a model of international investment based on endowment of information differences between foreign and domestic investors. They conjecture that when domestic investors hold cumulative information advantage over foreign investors about their own domestic assets, foreign investors tend to buy foreign securities during period of higher returns on foreign assets and sell when the return is low. Coval and Moskowitz (1999) suggest that geographic proximity effect works even within U.S domestic stock portfolios and information asymmetries are driving these effects. Ahearne, et al. (2004) and Suh (2005) demonstrate that because U.S. domestic investors have relatively more precise information of home securities, they are more willing to invest in domestic securities. Similarly, the effect of information asymmetry has also been recently corroborated in more comprehensive studies that include a number of additional countries other than U.S. (please see Chan at al. 2005 and Fidora et al, 2007). Bae et al., (2008) measure information asymmetry and relate it to home bias. They demonstrate that home analysts in 32 countries make more precise earnings forecasts for home stocks than foreign analysts do. On average, the increase in precision is about 8%. Furthermore, the magnitude of the home analyst advantage is linked to home bias. When the domestic analysts' forecasts are more precise compared to foreigners' forecast (more information asymmetry), foreign investors hold less of that country's assets.

However, Jeske (2001) shows that home bias is not accounted by asymmetric information issues in some countries and therefore still remains a puzzle. Similarly, in a recent study, Nieuwerburgh et al., (2009) claim that despite domestic investors gaining more information about foreign markets, they choose not to profit more from knowing information which others do not know. In sharp contrast to all studies claiming home bias arises because domestic investors suffer from information asymmetry problem, they show that learning amplifies information asymmetry (for details please see Nieuwerburgh et al., 2009).

Dahlquist et al., (2003) offer different explanation. By using data on US portfolio holdings they show that countries having weaker investor protection rights receive lower foreign investments. They demonstrate that the prevalence of closely held firms in most countries explain home bias

and also show that U.S. investors underweight countries with lower investor protection rights measures in place, particularly those rating high on potential risk of expropriation. They suggest that investor protection measures, particularly those related to foreign investment may be an important factor. Similarly, using comprehensive survey data of U.S. residents' holdings of foreign securities, Ahearne et al. (2004) demonstrate that indirect barriers (investor protection and accounting standard) and information asymmetric factors are important in explaining home bias phenomenon. Kho et. al., (2009) merge portfolio and corporate finance theories and conclude: "foreign portfolio investors exhibit a large home bias against countries with poor governance because their investment is limited by high optimal ownership by insiders (the "direct effect" of poor governance) and domestic monitoring shareholders (the "indirect effect") in response to the governance" (p. 1).

Chan at al., (2005) report that bilateral information asymmetry and country specific stock market development features are the most important factors explaining home bias. They show that transaction costs are correlated with home bias whereas Tesar and Warner (1995) and Warnock (2002) suggest that transaction costs do not explain the observed home bias. Haselmann et al., (2010) show that after the introduction of the Euro, which mitigateded exchange rate risk and transaction costs, home bias has significantly reduced in the Euro region.

Strong and Xu (2003) investigate the determinants of home bias using survey data of fund managers' view (US, UK, Europe and Japan). Contrary to all previous findings, they show that behavioural explanations are more important than institutional explanation. Similarly, a number of earlier studies have also reported behavioural factors as determinant of home bias. French and Poterba (1991) conjecture that investors may be simply optimistic about their domestic market and over-invest in their market. Similarly Shiller et al. (1996) also document the role of investors' optimism on home market performance. Kilka and Weber (2000) conduct an experiment on graduate investment students in U.S. and Germany and find that both groups are more biased towards their own domestic stocks. Glassman and Riddick (2001) conclude that the required adjustment needed to reflect the perceived riskiness of foreign assets is quite large (2-5 times the standard deviation of historical estimates for France, Germany, Japan and the United

Kingdom). Pastor (2001) and Li (2004) both confirm that investors have very strong subjective prior beliefs about the higher risk or lower returns of foreign stocks.

In summary, although the phenomenon of home bias is widely researched, particularly those observed by U.S. investors, the results on the possible explanations are inconclusive. A number of competing factors including information asymmetry, direct formal regulatory restriction, investor protection, stock market development features and behavioural factors have been documented in the literature but the home bias still remains a highly debatable puzzle in international finance.

2.6.2 Bilateral cross-country trade (gravity models) and investment barriers

A small number of studies have also investigated the role of bilateral information asymmetry on the determinants of international trade in assets, particularly securities. According to Portes and Rey (2005) a '*gravity model'* has been extensively used in modelling cross-country trade of goods and services since the 1960s. It aims to explain the bilateral determinants of trade flow between two countries using factors such as distance, language, culture and other bilateral variables. For instance, Frankel and Rose (1998) demonstrate that trade between two pair countries depends on the correlation of business cycles and distance. Based on these models some studies have also made use of the bilateral factors to control or explain home bias. In more recent studies (Chan et al., 2005 and Fidora et al., 2007) pair country factors such as distance between capital cities, common language, bilateral trade and equity market correlation are used to model home bias. Except for correlation, all bilateral factors are shown to be statistically significant.

2.6.3 Portfolio holdings and investment barriers

Portes and Rey (2005), Chan et al. (2005) and Fidora et al. (2007) all note that empirical evidence in the area of international portfolio holdings have been constrained by the unavailability of quality and bilateral equity holdings data. Most the studies are based on investments by U.S investors and investigate the issue of home bias. The only exceptions are Dahlquist et al., (2003) and Gelos and Wei, (2005). Dahlquist et al, (2003) use the data of U.S. investors cross-country holdings for the year 1997 obtained from *US Treasury Department* and

notes that in the absence of home bias and closely held shares variable, the coefficient on the world market portfolio should be one (i.e. the ICAPM holds). However, the coefficient is 0.1496 with *t*-statistics of 5.59. When they use the world float portfolio, taking account of the freely traded equities, the coefficient is 0.1610 with *t*-statistics of 14.68. However, when both the variables are used, only the world float portfolio is significant. They also find the variable of closely held share to be highly significant but they note that just because the closely held share variable is significant, it does not imply the absence of home bias effect. In fact, the presence of closely held firms creates home bias. Similarly, they do not find general investor protection measures, except for the risk of expropriation, stock market openness and development to be significant. This is in sharp contrast to the results reported by Chan et al. (2005) and Gelos and Wei (2005), both of which finds stock market development measures to be significant in country allocation decisions. The latter use more comprehensive data than Dahlquist et al. (2003). Similarly, Dahlquist et al. (2003) results also contradicts with finding of Agarwal et al., (2005) who show that US investors tend to hold higher level of portfolio in countries with better investor protection measures. Gelos and Wei (2005) use a propriety micro data on emerging markets mutual funds and show how level of transparency affects portfolio holdings for the emerging markets only.

Apart from conflicting results, existing studies, mentioned above, also do not address the issue of robustness, particularly the country specific effect in all their empirical methods.

2.7 Gap and contribution of the study

We first discuss the contribution of the first three empirical studies in this chapter. The contribution of the final chapter is further discussed in the hypothesis development chapter (chapter 3, section 3.4).

The persistence of home bias indicates that, on aggregate, foreign investors allocate relatively large fraction of their wealth to domestic assets. This suggests that if we are able to control the effect of home bias, we should be able to explain the determinants of foreign equity portfolio country allocation. Most the earlier studies in international equity portfolio investment provide theoretical explanations of why investors may not hold the world market portfolio i.e. why the

ICAPM may not hold in practice. Moreover, as noted earlier, the results of scanty studies modelling foreign equity portfolio holdings are inconclusive. A major factor limiting research on foreign equity portfolio investment is the lack of cross border holdings data. We make use of the recently available high quality bilateral foreign equity portfolio holdings survey data of International Monetary Fund known as Co-ordinated Portfolio Investment Survey (CPIS). Furthermore, Chan et al., (2005) remark that most of the existing studies are from the perspective of U.S. investors and they leave the question open whether the explanations of wide cross-sections of source countries are similar or not? Similarly, few of the existing studies that do include multiple source countries only investigate the investment from developed to other developed countries (Chan et al., 2005). Compared to developing countries, generally the U.S. and other richer countries have more developed equity markets, higher standard of information disclosure and better investor protection climate. It is therefore important to examine whether the inclusion of developing equity markets as host countries yields similar results or not?

This study makes number of contributions to the existing literature. First, it extends the evolving literature on foreign equity portfolio investment by investigating the role of different factors (transaction costs, country specific equity market characteristics and investor protection) in modelling FEPA. Our study is the first to use three different components of transaction costs in explaining the cross-country equity portfolio allocation. Transaction costs are barely considered in any other studies on foreign equity portfolio holdings despite its importance shown by various theoretical models (see chapter 3, section 3.1). In our second empirical investigation, we show that in addition of stock market development factors reported in the literature, equity market volatility and exchange rate volatility are also important explanatory factors. To the best of our knowledge, no other study has investigated the role of equity market volatility despite good theoretical basis (see chapter 3, section 3.2). In the third empirical study, we attempt to resolve the controversial issue of investor protection and foreign equity portfolio holdings. We segregate the effect of general investor protection measure (quality of institution) and investor protection measure specific to foreign investments (investment profile, see chapter 3, section 3.3), in investigating their impact on foreign equity portfolio investment.

Second, most of the existing studies are based on U.S. investment data and use cross sectional approach in their methodological treatment. However, in our study we pool bilateral data from 36 countries (developed and developing) for the period of 2001-2006 with 562 bilateral cross sectional units and over 3000 observations. Such comprehensive dataset provides rich variation (*between and within*) with countries ranging from most developed like USA, UK, Japan etc. to developing countries like India, China, Indonesia and so on. In contrast to the cross-sectional approach followed by existing literature, we test our hypotheses using the more efficient *random effect* and the robust *fixed effect* models within a panel-data framework (see Chapter 5 for the advantages of panel data models).

Finally, as portfolio flows have been shown to be of great importance in case of emerging markets (Errunza, 2001), we focus on the dynamics of equity portfolio flows on domestic return and possible global financial linkages for four Asian emerging markets using high frequency daily equity portfolio data. We combine two strands of literatures, one focussing on long term equilibrium relationship and the other on short term dynamics to provide comprehensive evidence on the role of foreign equity portfolio flows on global financial linkages of Asian emerging markets (for details please see chapter 3, section 3.4).

The following chapter discusses the development of hypotheses and further discusses the contribution for each empirical chapter.

2.8 Chapter summary

The literature on international or foreign equity portfolio investment during the period of 1970-1990 was dominated by the development of capital market equilibrium models. These theoretical models attempted to model different barriers to international investments in testing the ICAPM. The objective was to show why foreign investors may not hold the world market portfolio as suggested by the ICAPM.

The empirical evidence on testing most of the equilibrium models so far has been constrained by the unavailability of high quality cross-country bilateral holdings data. Most existing studies include US micro level (mutual fund) data to explain the phenomenon of home bias. The results

so far have been inconclusive. A small number of studies have also used the gravity models from international trade literature investigating trade of foreign securities. Similarly, even smaller numbers of studies have investigated the determinants of foreign portfolio holdings, again constrained by unavailability of cross-country bilateral data.

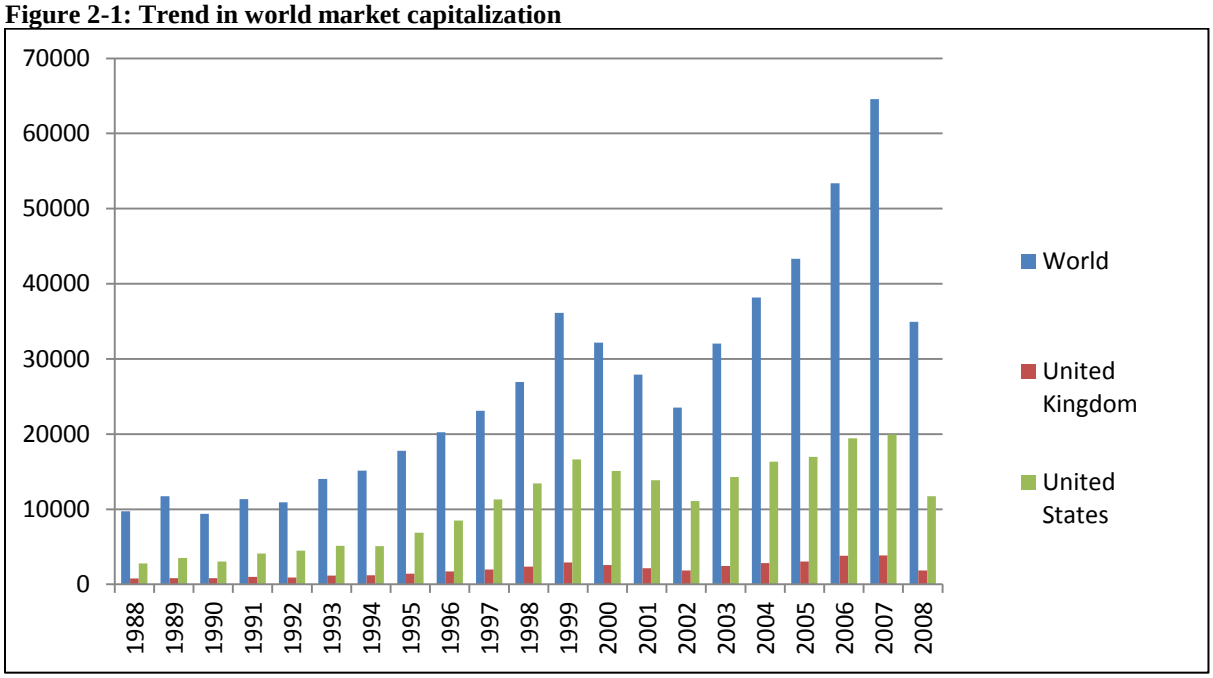
The findings of all the empirical and theoretical studies so far are inconclusive with conflicting results with some describing formal direct barriers and others indirect barriers such as investor protection, information asymmetry, stock market development, etc. as the possible explanatory factors of foreign equity portfolio investments.

The lack of studies modelling foreign equity portfolio holdings and the recent availability of cross-country foreign equity portfolio holdings data from IMF motivated us to investigate the role of different factors influencing foreign investors' decision of cross-country allocation.

Table 2-1: Foreign equity portfolio investment (holdings)

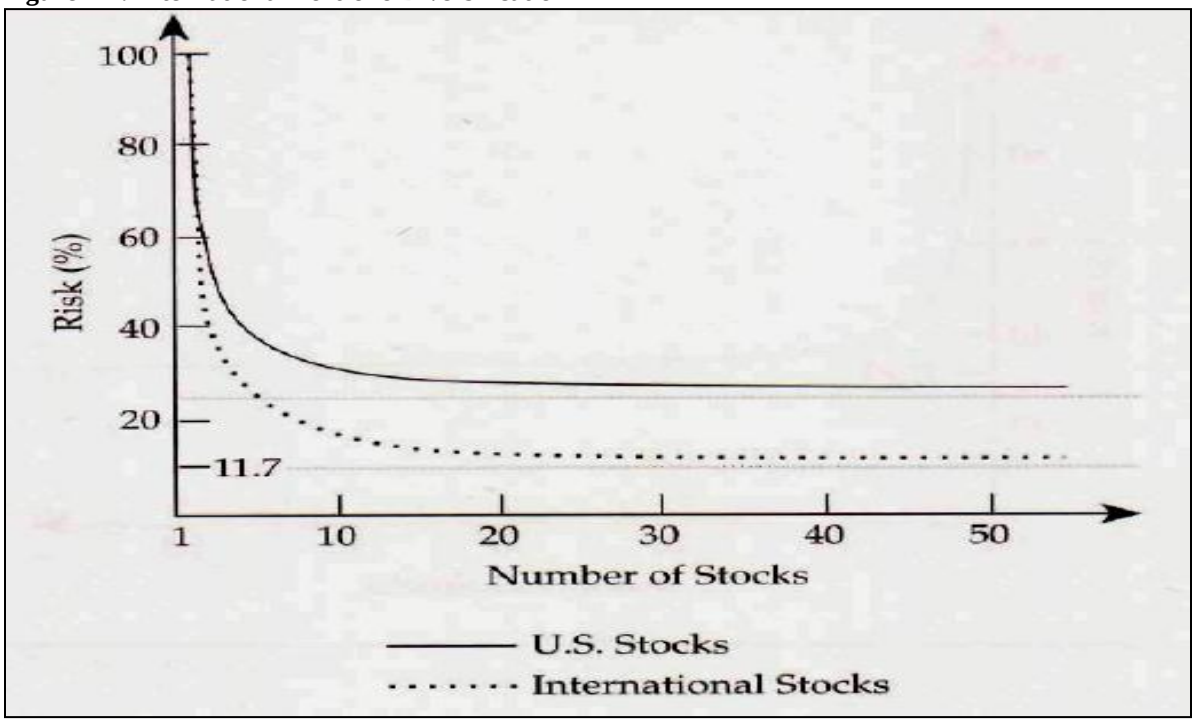
Country	Portfolio Allocation
USA	0.3776
UK	0.1573
France	0.1081
Germany	0.0882
Japan	0.0794
Switzerland	0.0533
Italy	0.0343
Finland	0.021
Sweden	0.0209
Canada	0.0171
Australia	0.0146
Belgium	0.0108
Korea	0.0107
Indonesia	0.0101
Russia	0.0058
Taiwan	0.0058
Norway	0.0057
Denmark	0.0056
Brazil	0.0054
Austria	0.0045
Mexico	0.0042
China	0.0041
India	0.0031
Greece	0.0028
Portugal	0.0027
Hungary	0.002
Turkey	0.0019
Thailand	0.0018
Poland	0.0017
Malaysia	0.0015
NZL	0.0015
Czech Republic	0.0009
Argentina	0.0005
Chile	0.0004
Philippines	0.0004
Peru	0.0002

Figure 2-1: Trend in world market capitalization



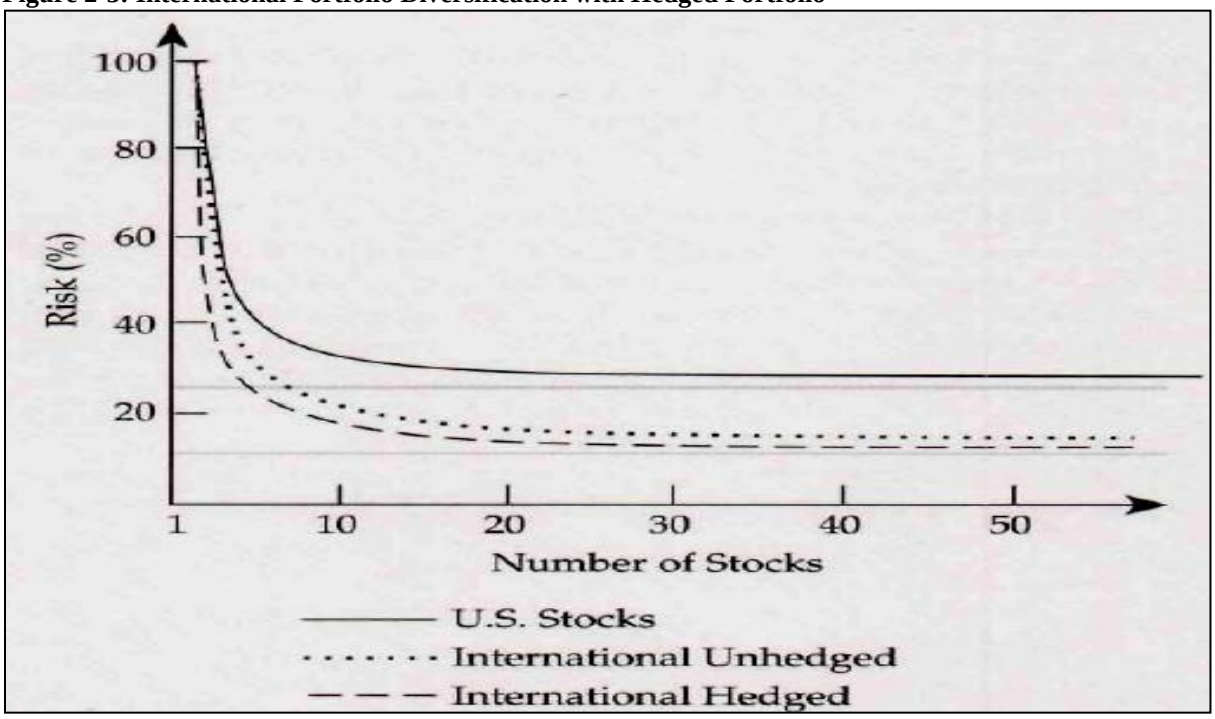
Source: World Bank

Figure 2-2: International Portfolio Diversification



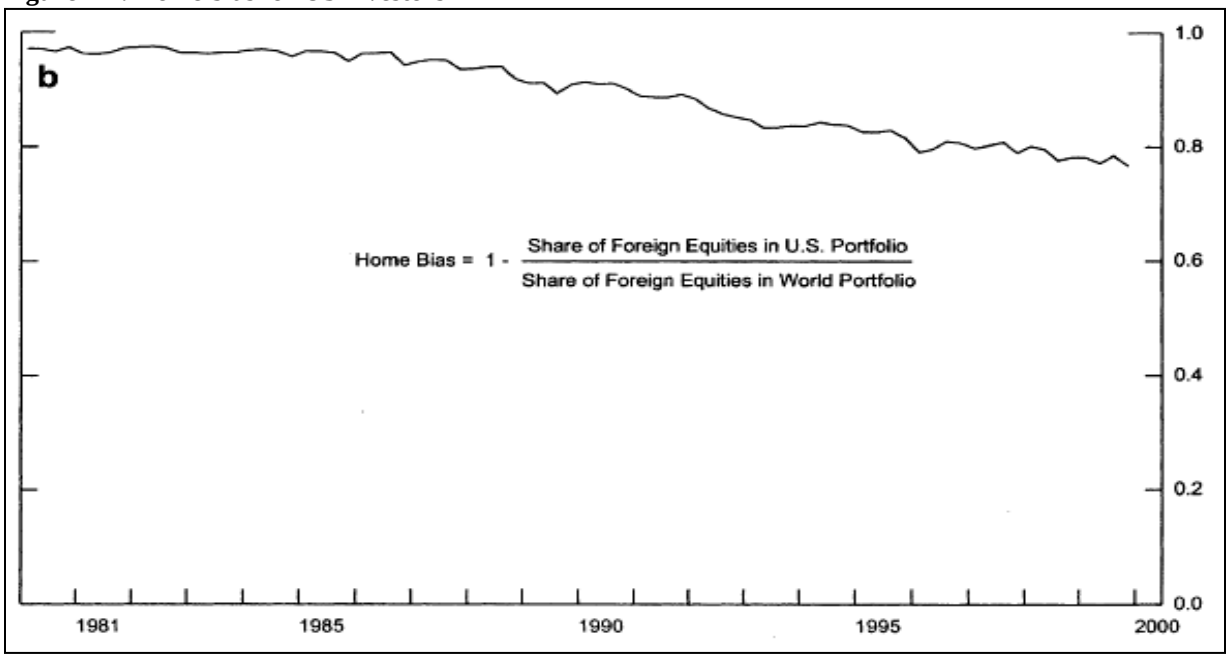
Source: Solnik (1974)

Figure 2-3: International Portfolio Diversification with Hedged Portfolio



Source: Solnik (1974)

Figure 2-4: Home bias for US investors



Source: Ahearne et al. 2004

Chapter 3 Research questions and hypotheses development

3.1 What is the role of transaction costs in explaining FEPA?

Do investors hold higher proportion of international equity in countries with lower transaction costs? We need to base our argument on good theoretical basis before developing each of the factor specific hypotheses. Stulz (1981a) develops an international asset-pricing model explaining the effect of transaction costs as one of the barriers to international capital investment. However, as transaction costs and turnover should have inverse relationships, Tesar and Werner (1995) and Warnock (2002) note that transaction costs do not help explain the observed home bias for U.S. investors. They find higher portfolio turnover rate on foreign rather than domestic market. Similarly, using data on U.S. equity portfolio and direct measure of transaction costs compiled by Elkins/McSherry (for details see section 4.2, page 87), Domowitz et al., (2001) also do not find any relationship between transaction costs and home bias detected in U.S. equity portfolios. However, in a recent study, Haselmann et al., (2010) demonstrate that after the introduction of the Euro in European countries, home bias has diminished because of the reduction in transaction costs. Similarly, Chan et al., (2005) using mutual funds data from 26 developed and emerging markets find that transaction costs are inversely related to foreign bias (tendency to over or underweight a foreign market relative to ICAPM). They define foreign bias as the ratio of the share of country *j* in the mutual funds holding of country *i* to the share of country *j* in the world market portfolio. Based on their result, they note "Intuitively, foreign investors would have greater desires to invest more in countries with large stock market capitalization, with high stock market turnover, with lower transaction costs, and in non-emerging markets" (p. 1527). Furthermore, Gelos and Wei (2005) employ turnover ratio as a crude measure of liquidity/transaction costs and report similar results.

This above discussion indicates that transaction costs could be a significant factor in explaining bilateral foreign equity allocation. Investors may overweight a country with lower transaction costs and vice versa. This suggests that after controlling for home bias we should be able to demonstrate whether transaction costs have any impact on bilateral cross-country equity investment as implied by recent studies (Chan et al, 2005, Gelos and Wei, 2005 and Haselmann et al., 2010).

Solnik and McLeavey (2004) remark that the impact of transaction costs is often disregarded in international portfolio management. They suggest that transaction costs should be accounted in, particularly for active global portfolio management, as they significantly vary among countries. They further state that higher transaction costs could reduce the expected return and benefits of global diversification. To the extent diversification benefits may reduce risk, the incorporation of transaction costs could reduce the expected return, thus minimizing the benefits of international diversification. This may explain the difference in equity returns between paper portfolio and portfolio managed in practice. The importance of transaction costs may be more pronounced when investing in thinly traded equity markets, particularly the emerging markets. Solnik and McLeavey (2009) suggest that a portfolio manager should strive for the best execution costs for a trade. Best execution refers to the most favourable costs the client needs to incur given the market condition and circumstances at the time of trade. As explained in the following section, execution costs could take different forms with some being explicit and measurable while other implicit and more difficult to measure and estimate.

Commissions are major components of transaction costs paid to the brokers and are generally negotiated. The level of commission depends on the characteristics of trade, such as liquidity of the stock and size of the order. Solnik and McLeavey (2009) note that brokerage commissions on stocks tend to be low in the United States and is generally 0.1% of large transactions. Such commissions are larger in other countries, typically ranging from 0.1% to 1%, particularly in emerging markets. The commission paid by the clients to the brokers, in many cases, not only represents the services of execution but it also allows the clients to use the brokers' research and other services.

Fees are some additional fees need to be paid for compensating for various services, such as post-trade settlement costs and stamp duty fees in UK. Commission and fees are explicit costs and are measurable with relative ease, but getting the most cost effective execution may not necessarily imply the minimization of these costs.

Market impact is an implicit cost that needs to be borne by investors. Execution of transaction generally has impact on the price of the security. Market impact refers to the difference between

the actual execution price and the market price that would have prevailed had the investor not traded on the security. For instance, an order to buy a security, which is relatively larger than a normal transaction volume, will generally have significant upward impact on the security, at least for a temporary period. As such, one needs to estimate the market impact of the trade. Measuring the overall price impact is a difficult task to undertake because the price that could have prevailed had the transaction not taken place, i.e. the benchmark price, is not observable. One way this is computed is to use the volume-weighted average price on the day of the transaction. The key idea is that the unbiased estimate of the benchmark price is the average of the low and high price observed. Market impact is then measured as the percentage difference between the execution price and this benchmark price. Solnik and McLeavey (2009) note that the market price is excessively dependent on the order size, market liquidity for the security traded, and the speed of execution sought by the managers. The effect of market impact could be extensively significant for institutional investors who usually trade securities in order sizes, which are a significant percentage, and even multiple, of the typical daily trading volume for the security.

All the above-mentioned costs are incurred on an executed trade. However, in case where investors are not able to execute, there is an opportunity cost for non-execution. Such opportunity cost refers to the loss (gain) due to delay in the transaction against the stipulated time or failure to complete the transaction in full. This could be particularly important in thin market which suffers from illiquidity. If it takes hours or days to execute a trade, then the investor could suffer significant loss due to adverse movement. For example, a manager might act on privileged and costly information to buy but if the price moves up before he is able to execute the transaction, it could have significant adverse impact. Similarly greater the delay less the opportunity to exploit any privileged information as the delay opens opportunity of information leakage.

The above discussion highlights some of the practical issues when dealing with different forms of transaction costs. We now explore the literature concerning the impact of transaction costs on expected return, diversification benefits and other aspects of security trading.

The role and importance of transaction costs in investments is not trivial. A number of studies (Constantinides, 1986; Davis and Norman, 1990 and Uppal, 1993) have developed models of international portfolio choice incorporating the effect of proportional (variable) transaction costs on the reallocation effects of portfolio holdings. A common finding of the studies is that as the magnitude of transaction costs increases the reallocation of foreign portfolio decreases in the respective equities. Keim and Madhavan (1995) suggest that transaction costs are important in determining investment performance and may significantly diminish or possibly outweigh the expected value generated by an otherwise good investment strategy. The consumption and portfolio choice model developed by Rowland (1999) shows that as the level of transaction costs increases, the rate of portfolio diversification decreases. This implies that despite the well-known benefits of international diversification, investors may underweight countries with higher transaction costs.

Other studies have also shown that assets with high transaction costs usually trade at a lower price relative to their expected cash flows (Amihud and Mendelson, 1986; Brennan and Subrahmanyam, 1996 and Datar et al., 1998). Furthermore, higher transaction costs shift the bias in investment decision towards assets with shorter pay-off, thus reducing the average-holding period (see Blukey and Harris, 1997 and Green et al., 2000 for details). Similarly, Bekaert and Hodrick (2009) confirm that trading cost is generally "priced". That is, equities with otherwise similar characteristics and similar expected cash flows trade at different prices when their trading costs are different. This suggests that high transaction costs may reduce the incentive to trade and produce thinner markets constraining the potential for mobilizing the resources for investment because the cost of equity goes up.

Similarly, Green et al., (2000) using long dataset on UK stock market, suggest that the increase in transaction costs also generally increases market volatility, which is probably through thin trading effect. They suggest that emerging markets must get the level of transaction costs right in order to influence their market volatility. They also note that emerging markets should not only focus on those aspects of transaction costs which they use as regulatory measures, such as stamp duty but must also concentrate on other components of transaction costs as discussed earlier. De Roon et al., (2001) find that for US investors investing in emerging markets, the diversification

benefits disappear when short selling and transaction costs are incorporated. They note tests for portfolio spanning and intersections have been applied to numerous problems in finance and a very important assumption in all such studies is the absence of market friction (transaction costs). However, in practice this is not the case and transaction costs are important elements of investment strategies. They further note that the presence of high transaction costs is one of the key impediments to foreign investments in emerging markets. Using the Emerging Market Data Base (EMDB) of the International Finance Corporation (IFC) a number of studies (see Errunza, 1983 and Harvey, 1995) show that the portfolio of developed market could be significantly shifted upward (i.e. the risk-return profile could be improved) when assets from emerging markets are included. However, all these studies assume absence of transaction costs, which is an unrealistic assumption for emerging markets where generally the transaction costs are significantly higher relative to developed markets (Solnik and McLeavey, 2009). Bekaert and Urias (1996) strive to overcome this problem by using closed-end country funds as the returns are attainable to investors. They report mixed evidence on the benefits of portfolio diversification. Errunza et al., (1999) using industry portfolios, multinational corporation stocks, closed-end country funds, and American depository receipts, demonstrate that U.S. investors can create mimicking portfolios from U.S. traded securities that are highly correlated with the IFC emerging market indices. However, they show that direct equity portfolio investment in five out of nine emerging markets provide significant diversification benefits beyond diversified portfolios created by U.S. traded securities. However, their study does not include the effect of transaction costs.

De Roon et al (2001) use the same IFC indices as in Harvey (1995) but they incorporate transaction cost. They conclude that if market frictions are ignored the resulting portfolios of United States, Europe or Japan show strong case of diversification benefit when emerging markets are added. However, the diversification benefit disappears when transaction costs and short sale constraints are incorporated. They demonstrate that with an investment horizon of six months and round trip costs of 0.5 percent, the diversification benefits from investing in emerging markets are absent. This clearly indicates that investors tend to underweight markets with higher transaction costs, particularly the emerging markets.

Of course, investor's decision to allocate greater proportion of capital to domestic securities may be influenced by the home bias. Investors may feel that they are informationally disadvantaged while investing in foreign markets and hence they are better off investing more in domestic securities. However, as noted earlier, if we control for home bias as well as for factors that have been found important in international diversification literature, we should be able to demonstrate whether transaction costs significantly influence the international equity portfolio allocations. By using a comprehensive dataset of bilateral cross-country foreign equity portfolio holdings and four different measures of transaction costs for 36 countries, we examine whether different components of transaction costs significantly influence international investor's decision to underweight or overweight country allocations.

In spite of critical role of transaction costs acknowledged by previous studies, very few have examined its influence on international portfolio investment decisions. Chan et al. (2005) use transaction costs data of Elkins-Sherry co. in examining how mutual funds of 26 countries allocate their investment between domestic and foreign equity markets. However, they do not analyse the impact of each component (i.e., commission, fees, and market impact) that makes up the Elkin-Sherry co. transaction cost measure. Gelos and Wei (2005) merely control for transaction costs by using average turnover ratio as a proxy in examining how their newly constructed measures of transparency affect the investment choices of the emerging market equity funds. The apparent lack of research on the impact of transaction costs on international portfolio allocations is mainly due to unavailability of cross-border bilateral portfolio holdings data on a country-by-country basis and good estimates of transaction costs. In this study, we use bilateral country-by-country portfolio holdings data recently made available by the IMF and provide evidence of the extent to which portfolio allocation choices are influenced by using the country level transaction cost estimates maintained by Elkin-Sherry and reported by S&P global stock market fact book.

Our study makes important contributions to the existing literature. First, while controlling for the home bias phenomenon we show the role of transaction costs in demonstrating why certain countries receive higher or lower levels of foreign equity portfolio allocations than others. Second, we use an extensive dataset comprising bilateral portfolio holdings for 36 developed and

developing countries over a recent period of 2001 to 2006 with over 500 bilateral cross sectional units and approximately 3000 observations enabling us to comprehensively examine our research hypotheses. Finally, in contrast to most of the previous studies that use cross-sectional approach, we test our hypotheses robustly by using the random effect, fixed and between effect panel data models.

We test the following hypotheses:

H_1 Countries with lower level of average commission attract higher level of FEPA.

H_2 Countries with lower level of average fees attract higher level of FEPA.

H_3 Countries with lower level of average market impact cost attract higher level of FEPA.

3.2 Summary of findings

The results show that all three direct measures of transaction costs (commission, fees and market impact) distinctly and significantly affect investment allocation choices and countries with lower transaction cost seem to attract greater foreign equity portfolio investment. There are two important implications of this result. First, future research on international portfolio diversification cannot afford to ignore the role of transaction costs in country allocation decisions. Second, national policy makers should aim to reduce transaction costs for attracting higher levels of foreign equity portfolio investments.

3.3 What is the influence of country specific equity market characteristics on FEPA?

What is the role of country-specific equity market characteristics in explaining cross sectional and temporal variation in foreign equity portfolio allocation? We answer the question using bilateral cross-country equity investments and various country-specific equity market features. As mentioned earlier, there could be direct legal barriers to foreign portfolio investment, such as different legal status accorded to foreign and domestic investors (Bekaert, 1995). Similarly, the presence of indirect barriers, such as quality, timely and reliable macro and corporate information, investor protection and accounting standards may also restrict foreign equity portfolio investment (see Bekaert and Harvey, 1995, 2003; Errunza, 2001; and Hunter, 2006). Further, market specific risks, such as size (breadth), liquidity (depth), transaction costs and informational efficiency of capital market, commonly known as stock market development factors, could also potentially affect foreign investment (Chan et al., 2005). Our second empirical work focuses on country specific equity market characteristics and makes important contributions to the literature.

First, we try to explain the role of country-specific equity market characteristics in explaining the cross sectional and temporal variation of why certain countries receive more or less foreign portfolio allocation than others? Apart from Gelos and Wei (2005) who focus on emerging markets only and Chan et al., (2005) who explain foreign bias, no study has undertaken comprehensive empirical study to investigate why different countries receive different level of foreign equity portfolio investments or foreign investors hold different level of FEPA.

Second and as noted earlier, we pool bilateral data from 36 countries (developed and developing) for the period of 2001-2006 with over 500 cross-section units and over 3000 observations. Such comprehensive cross sectional and temporal dataset provide rich variation to test our hypothesis robustly by using panel data models. Baltagi (1995) suggests that a panel data set-up, compared to cross-section and/or time series data, is more informative, exhibit less collinearity among the variables and provide more variability, greater degrees of freedom and higher efficiency. Panel set-up thus produces more reliable parameter estimates. Similarly, application of fixed effect model controls for individual heterogeneity for more robust estimates. Models not controlling for

individual heterogeneity run the risk of resulting in biased estimates. Methodological details are explained in the subsequent chapters (see chapter 5).

Finally, we show that in addition to the variables used in the existing literature there are other important market-specific factors that should be used in modelling foreign portfolio allocation. Such additional sources so far been ignored in the literature despite sound theoretical basis for their inclusion in modelling FEPA. Two such factors are market-specific stock market volatility and foreign exchange rate risk. We discuss the theoretical justifications for their inclusion in the subsequent sections.

3.3.1 Stock market development/size and FEPA

Levine and Zervos (1998) claim that market which is more developed in terms of size (breadth) positively enhances the ability of mobilizing capital and diversify risk. Bekaert and Harvey (2000) and Chan et al., (2005) propose that foreign investors tend to invest more in markets that are bigger and relatively more developed. Motivated by the measure used by Levine and Zervos (1998), our study uses the logarithmic ratio of stock market capitalization to GDP as a measure of stock market development and size. La Porta et al., (1998) note that the former measure reflects the breadth of equity market capitalization capturing the significance of stock market in the economy. The first hypothesis we test, as reported below, is whether stock market development/size matters for foreign investors.

H_4 Stock market development/size has positive influence on FEPA.

3.3.2 Market liquidity and FEPA

Ngugi et al., (2005) consider *stock market microstructure* as an institutional framework defining the return generating process. For our study, we use liquidity as one of the sources of micro-structural effect. Liquidity refers to the ability to transact quickly without substantially moving prices (Glen, 1994). Ngugi et al., (2005) note that the definition of liquidity encompasses a number of transactional properties of the market. These properties are tightness (cost of turning around a position over a short period), depth (size of an order flow innovation required to change prices by a given amount) and resiliency (speed with which prices recover after a random

uninformative shock). Madhavan (1992) claims that market depth, which measures sensitivity of prices to order flow, is influenced by the quality of information acquired by market markers. Higher the information asymmetry lower will be market depth and consequently, lower the market liquidity. This suggests that market efficiency also has direct impact on market liquidity. However, Cornell and Sirri (1992) conjecture that market liquidity increases with information asymmetry as insiders are able to exploit private information and obtain superior trade relative to the contemporaneous liquidity trades. This implies that the presence of informed traders in the market may not reduce market liquidity (see Ngugi et al., (2005) for further discussion).

Solnik and McLeavey (2009) conjecture that large institutional investors are generally careful and may only invest very small part of their portfolio in markets with smaller market capitalization and poor liquidity. It may be difficult for large institutional investors to get out of the small and illiquid market and even if they do, the cost could be potentially very high. In an illiquid market, an excellent positive performance on the overall index may not translate into similar gains for a particular portfolio because of significant price drop when the portfolio is liquidated. Thus, the effect of liquidity may partially explain why despite higher returns offered by emerging markets (Kohers et al., 2006) international investors underweight them.

The other risk of liquidity is the imposition of capital control measures by state authorities preventing foreign investors from liquidating their portfolio positions and repatriate proceeds. For example, following the 1997 Asian financial crisis, Malaysian government decided to re-impose capital control measures in order to prevent recurrence of stock market crisis caused by rapid exit by foreign investors (see Bekaert and Harvey, 2003).

Solnik and McLeavey (2009) suggest that investors who believe that markets are not fully efficient may not hold investments in the same proportion as suggested by ICAPM. Lack of liquidity has been mentioned as one of the key factors that demands additional risk premium and the determination of the risk premium is one of the key inputs in the tactical asset allocation decision. It is generally known that trade on assets with lower liquidity is executed at lower price relative to their expected cash flows (e.g., Amihud and Mendelson, 1986; Brennan and Subrahmanyam, 1996 and Datar et al., 1998). This implies that for illiquid assets investors

demand extra risk premium and therefore demand higher required rates of return. This further indicates that foreign investors may underweight countries with illiquid markets if liquidity risks are not adequately priced. The effect of liquidity may be more pronounced in emerging markets where it may take considerable time to execute transaction (Bekaert et al., 2007).

Following Levine and Zarvos (1998) and Ngugi et al., (2005) we use the turnover ratio (*Market Liquidity*) as the proxy for capturing market liquidity. Turnover ratio measures trading volume associated with a unit change in stock price. Levine and Zarvos (1998) state that although not a direct theoretical measure of liquidity, higher turnover is negatively related to transaction costs. This suggests that turnover ratio can also proxy the level of trading costs. Bekaert and Hodrick (2009) claim that turnover is inversely related to costs of trading equities because high trading costs cause investors to trade less. Amihud and Mendelson (1986) also corroborate the inverse relationship between turnover and trading costs. Bekaert and Hodrick (2009) further suggest that turnover is often regarded as an indicator of liquidity although it can also reflect the arrival of news that instigates trades. Damodaran (2010) remarks that one of the minimum requirements for a market to be efficient and therefore prices to be the best estimates of true values is that trading should be inexpensive, instantaneous and easy. This conjecture implies that liquidity measures may also reflect the degree of market efficiency. Following the literature, we test the following hypothesis:

H_5 Foreign investors prefer to overweight markets with higher liquidity.

3.3.3 Emerging markets and FEPA

Studies show that compared to markets in advanced countries emerging capital markets are less developed in terms of market development/size (Chan et al., 2005) and market efficiency (Harvey, 1995a, b and Fama and French, 1998). Chan et al., (2005) demonstrate that foreign investors significantly underweight emerging equity markets relative to the suggestion of ICAPM. Emerging equity markets, in contrast to their developed counterparts, are not only smaller in market capitalization but the industrial diversification in their stock market is also not broad enough to achieve adequate diversification for mitigating firm specific risks. For details, please refer Solnik and McLeavey (2009).

Similarly, in case of pricing efficiency, Harvey (1995a, b) note that returns in emerging markets are more predictable than developed markets. Harvey (1995b) provides empirical evidence on the inefficiency of emerging markets and attributes it to infrequent trading and slower adjustment to information released in the market. Similarly, Fama and French (1998) and Rouwenhorst (1999) demonstrate that market characteristics in emerging markets can be exploited to generate excess return over a given benchmark.

Damodaran (2010) argues that the release of timely and reliable information is an important element for valuing equity prices. However, information are sometime suppressed, delayed or fabricated by some firms, particularly if they hold bad news. He further claims that the potential for distortions is greater in emerging markets where information disclosure laws and corporate governance practices are weaker. For example, in 2008, the CEO and the top management of the highly acclaimed Satyam Computers stepped down after admitting to accounting fraud. Gelos and Wei (2005) use emerging markets mutual funds to demonstrate how lower level of transparency (corporate and macroeconomic policy) depresses the level of international investments. They also provide evidence that during 1997 Asian crises foreign investors left opaque markets at a much faster pace compared to the speed of exit in more transparent markets. Furthermore, Gelos and Wei (2002) claim that herding behaviour among investors tend to be more prevalent in less transparent countries, particularly emerging markets. They argue that when dealing with less transparent countries foreign investors' decisions are influenced more by what other investors are doing as opposed to a rational and independent assessment of market fundamentals.

The above discussion on the level of stock market development and price/informational efficiency suggest that the emerging market dummy we use in our regressions should be negatively associated with portfolio allocation. The significance of the dummy should provide indication that foreign investors prefer markets that are well developed in terms of market breadth and pricing/informational efficiency. Consequently, we test the following hypothesis:

H_6 Foreign investors prefer to underweight emerging markets.

3.3.4 Market volatility and FEPA

Drawing on the theoretical framework of Cooper and Kaplanis (1986), discussed in chapter 2, it is shown that variance negatively affects stock returns. Since variance is associated with total risk, foreign investor may avoid countries with higher stock market volatility. Similarly, equation 2-14 of Cooper and Kaplanis (1986) framework suggest an inverse relationship between foreign investors' portfolio allocation (x_i) and volatility (V) as shown below:

$$x_i = (V^{-1}/h\,)(R - c_i - k_i I)$$

However, despite sound theoretical basis there are not many studies that use volatility measures in modelling FEPA.

In line with our theoretical framework, we test the following hypothesis:

H_7 Foreign investors prefer to underweight markets with higher equity market volatility.

3.3.5 Exchange rate risk and FEPA

Solnik and McLeavy (2004) remark that currency risk premium must be earned by foreign investors for taking systematic risk which cannot be diversified away. They claim that despite diversification across countries, currency risk will always remain because currency movement influences all securities. The aggregate world market portfolio is sensitive to currency risk and should be taken into consideration in international portfolio management. This implies that just as volatility of equity markets denote the risk of the equity return, volatility attributed to currency movement should also affect investors' decision (see Solnik and McLeavey, 2004). Following the risk-return relationship argument of the international capital asset pricing model (ICAPM), investors should therefore underweight countries with higher movements in real exchange rate, particularly if pricing do not justify the risk. This may be particularly important when investing in emerging markets where exchange rates exhibit higher volatility relative to developed markets. In the following section, we explore the sources of exchanges rate risk encountered by a foreign investor.

As noted earlier, if the purchasing power parity relationship holds, there is no exchange rate risk because the movement in the differential inflation rate compensates the changes in exchange rate. However, there is extensive literature (see chapter 2 for details) which shows that deviations from absolute and relative purchasing power parity are observed almost all the time and between all the countries. Studies (see Alder and Dumas, 1983) claim that on average the PPP relationship tends to zero over long periods. However, there is extensive evidence that in the short run the PPP relationship fails to hold, thus adding a new dimension to international valuation theories that does not exist in the domestic asset pricing models (see section 2.5.1, Chapter 2). One of the principal reasons why PPP deviates from the theoretical prescription is the way real returns are determined. Domestic investors first convert the nominal return, gained by investing in foreign assets, into domestic return and subsequently deflate it with domestic inflation applying the domestic consumer price index (CPI). If the PPP relationship does not perfectly holds then investors in different countries have different notions of real return for the same asset because changes in inflation rates in both countries do not perfectly compensate movements in exchange rates. As such, the deviation of PPP is the core problem of international valuations affecting returns for domestic investors. Most of the asset pricing models define a country as a subset of investors who utilizes the identical CPI to deflate the nominal returns, which in reality is not the case.

Zimmermann et al., (2003) also state that the assumptions of the international capital asset pricing model that all investors have the same tastes, face the same set of consumption opportunities and PPP holds all the time do not represent the real world. Investors do not have same preferences over consumption across countries. Additionally, transportation costs, taxes, tariffs, and other barriers to trade and international investment, are the sources of differences in the structure of relative prices across countries. Similarly, the structure of relative prices changes differently over different periods in different countries. This suggests, particularly in the short run, the representative consumption basket differ in a time-varying manner across different countries and therefore there is no reason for PPP to hold. Because of the differences in consumption opportunities investors face exchange rate risk. Further, Solnik (1974b) also demonstrates in his model that exchange rate risks originate from unforeseen deviations from PPP. Any deviation from PPP affects the risk-return characteristics of internationally traded

assets and the effect is different for investors from different countries. This implies that the hedging properties of same asset, given changes in the cost of consumption, also varies according to countries. As investors are willing to hedge against the variability observed in the price of their consumption basket, prevalence of exchange rate risk causes different pricing demands of same set of assets across different countries and therefore different expected return. Consequently, investors in different countries choose different sets of efficient portfolios exposing them to real exchange rate risk when holding foreign assets. In line with aforementioned discussion, we test the following hypothesis:

H_8 Foreign investors tend to underweight markets which exhibit higher real exchange rate volatility.

3.4 Summary of findings

Our study confirms that country-specific stock market characteristics, i.e. market breadth, liquidity, transaction cost, market efficiency and market volatility, are the key factors in explaining the wide variation in bilateral FEPA. In our sample, we find that country-specific equity market characteristics explain almost 45% of the total variation in FEPA including the stock market and exchange risk volatility measures. An important implication of the findings, particularly for the developing countries, is that by improving the breadth, liquidity and information/transaction efficiency of capital markets, countries should be able to attract higher levels of foreign equity portfolio investments.

3.5 Does investor protection matter?

Stulz (2005) notes that despite the theoretical case following the marginal productivity of capital and the evidence on the gradual removal of formal barriers in emerging countries foreign investors hold relatively larger proportion of foreign equities of developed countries compared to developing countries. He posits that in the presence of poor country governance firms are usually valued less by the capital markets. Stulz (2005) exemplifies that following the marginal productivity theory an equity portfolio investment of US$ 100 might be more productive in Indonesia than in United States. However, the investment will most probably not take place in Indonesia if investors expect to receive higher return on their investment in United States. Poor governance in Indonesia prevents foreign investors in receiving the full benefits on their investment because third parties reap the benefits before they are actually received by the outside investors. For example, the controlling shareholders might spin off the earnings for their own private benefit rather than providing the expected return to outside investors. Similarly, Stulz (2009) also argues that the quality and timely disclosure of important information by the state may have important influence on a country's welfare, firms and investors' portfolios, including the degree to which foreign shareholdings observe home bias.

Bekaert and Hodrick (2009) argue that indirect barriers (information disclosure and investor protection) to international investments could be reduced through better corporate governance. It is well known that foreign investor made great losses during the 1997-98 East Asian crises due massive depreciation of currency and decline in their stock market. Johnson et al., (2000) note that the weakness of the legal institutions, which promotes effective corporate governance, in part, played an important role in the sharp depreciation of the currency and massive downfall of the East Asian stock markets fetching huge losses to foreign investors. Dialog (1999) demonstrates the vulnerability of foreign investors to expropriation during 1997-98 Asian crises. He notes that Korean minority shareholders (including foreign investors) of large firms, that included global companies such as Samsung Electronics, objected to the transfer of cash resources to other entities and private parties. These transfers were mainly targeted to support loss making subsidiaries, pay off the managements' personal debt and in some cases the funds went directly into foreign bank account.

The importance of investor protection has also been extensively emphasized as one of the key factors explaining the cross sectional differences in the development of capital markets and the ability of corporations to raise external finance. Stulz (2005) argues that if legal and contractual rights of minority shareholders are not well protected then those who control the firms' activities (large shareholders and managers, also called insiders) can more easily exploit the firm's resources for their own private benefits. The source of investor protection is described by Jensen and Meckling (1976)' classical *agency problem*. They note that insiders use the profits of the firm to benefit themselves rather than returning the benefits to outside investors. The vast literature on the agency costs of managerial discretion (see La Porta et al., 1997 and Stulz, 2005) describes how management can pursue investment activities that are not in the interest of shareholders rather targeted to fulfil their own private welfare. Bekaert and Hodrick (2009) argue that private benefits of control by the insiders may lead a firm to make suboptimal decisions (for its shareholders, including foreign shareholders) with respect to investment, recruitment and others. They conjecture that such practices prevail in countries with poor investor protection and poor accounting standards. They further note that the list of such countries not only includes developing but also many European countries where the prevalance of private benefits of control may be substantial and can depress stock prices.

Cross country differences in corporate governance are investigated in a number of influential but controversial articles by economist Rafael La Porta, Lopex-de-Silanes, Andrei Shleifer and Rob Vishny (LLSV, 1997, 1998, 2000). The LLSV studies show that the investor protection measures across the countries correlates strongly with a classification of the legal systems based on the idea of "legal origin". The primary distinction being between English common law countries, such as Canada, U.S.A and U.K; French civil law countries, such as Belgium, France and Italy; German civil law countries, such as Austria, Germany and Switzerland and Scandinavian civil law countries, such as Denmark, Finland and Sweden. The general conclusion of LLSV articles is that the English common law countries provide higher investor protection rights compared to civil law countries and others.

LLSV demonstrate that the legal origin correlates well with concentration of ownership, the size of the stock market, and the level of dividend payments. For instance, in civil law countries with

lower investor protection rights, corporate ownership is much more concentrated than the English common law countries. LLSV also confirm that countries with greater legal protection of investor rights have higher number of firms listed on the public stock market, larger corporate valuation and higher economic growth. LLSV (1997) conjecture that the differences observed in the breadth, depth, and market efficiency of financial system around the world can be partly attributed to the variations in investor protections against expropriation by insiders. This is reflected in the country's legal rules and the quality of their enforcement. They provide evidence that legal rules and the quality of enforcement greatly differ across countries. They further claim that although reputation and bubbles may help raise external funds in few cases, variations in legal protection and its enforcement are central to understanding why firms raise more funds in some countries than in others. To a significant extent external investors provide finance to firm because their rights to the premium for bearing risk are protected by law. Minority investors are more vulnerable to expropriation, and are hence dependent on the quality of a country's law and their effective observance. They are willing to invest more in countries where they hold higher confidence in the legal institutions.

However, China reflects an important counterexample. Allen et al., (2005) argue that China does not have well-developed legal and financial system but is it still experiencing extraordinary real growth. Furthermore, while China constitutes a large state-controlled sector, yet it is the private sector that is driving their economic growth. This signifies that alternative financing channels and corporate governance mechanism, possibly based on reputation considerations, may also promote the growth of the private sector. This counterexample is somewhat moderated by Miskin (2006). He argues that like the former Soviet Union during 1950s and 1960s, China's economic growth is fuelled by high saving rate, massive build-up of capital and shifts of large pool of underutilized labour from subsistence agriculture to manufacturing. However, in case of Soviet Union, as the pool of subsistence labours was used up, growth slowed dramatically and the country was not able to keep up with Western economies. The Chinese example implies that, in the early stages of development, economic growth may be rapid even in the face of weak regulatory and financial development. However, to reach the next stage of development and eventually become rich, China may need to allocate their capital more efficiently. To achieve this, China needs to develop institutional infrastructure and develop their financial system

ensuring they direct capital to its most productive sector. Chinese leadership is well aware of this challenge but, as Miskin (2006) notes, whether China will succeed is an open question?

LLSV (1997) further corroborate that developed countries are better at enforcing the investor protection measures than developing countries implying that as countries develop over time the quality of enforcing their legal rules protecting interest of shareholders and creditors also improves. Using 49 countries of different legal origin, they conclude that a good legal environment is significantly related to the development of a country's capital market. They argue that because good legal environment protect investors against expropriation by entrepreneurs (insiders), the potential financiers' willingness to surrender funds in exchange of securities is raised.

LLSV (2000) suggest that investor protection turns out to be crucial because, in many countries, expropriation of minority shareholders by the controlling shareholders and managers is extensive. Foreign investors, who are among the outside investors, finance corporations not only in expectation of return but also how well their interest is protected from expropriation by the controlling shareholders, managers and the state. LLSV (1997) exemplify various forms of expropriation. They note that expropriation may be direct theft of profit or the selling of the outputs, assets or securities to other firms at a significantly cheaper price for private benefits of insiders. Although legal, but such form of transfer pricing, asset stripping, and investor dilution is regarded as theft and erodes trust. In other circumstances, expropriation takes the form of diversion of corporate opportunities from the firm, employing unqualified family members in managerial positions, or overpaying executives.

Mishkin (2006) also suggests that usually there is a positive correlation between a good system of law and a well-developed financial system. He uses U.S. as an exemplar of Anglo-Saxon legal system, and claims that it is among the wealthiest countries in the world, with a financial system which is relatively more efficient at putting capital to new and productive uses, such as in the technology sector. He concludes that the Anglo-Saxon legal system is a big plus for the U.S and therefore conjectures that a sound legal system, establishing and enforcing good property right contracts, is important for producing wealth. He further notes that by just having laws on the

book and a high number of lawyers to protect property rights and enforce contract is not enough to encourage the allocation of capital to its most productive uses, which is key to economic growth. For example, Philippines has a legal system based on U.S. law, yet its judiciary is known to be one of the most inefficient in the world. As such, given the high cost of contract enforcement, the Philippines has enjoyed much lower growth rates than the rest of the Asia.

Shleifer and Wolfenzon (2002) construct a model wherein an insider or an entrepreneur who sets up a firm has chances of being caught and fined if the entrepreneur expropriates minority shareholders. They demonstrate that the probability of such entrepreneurs of being caught is higher in countries with better shareholders protection. Similar to other studies their model also predicts that better investor protection leads to greater recourse to external finance by firms.

Stulz (2005) develops model of international portfolio investment grounded in the stylized fact of LLSV (1999). He focuses on the issue that outside the U.S. and the U.K., firms ownership are not diffused but are rather controlled by large shareholders (also refer to Claessens et al., 2000 and Faccio and Lang, 2002). They conjecture that all investors risk expropriation by the state and the outside investors additionally risk expropriation by the corporate insiders i.e. inside shareholders and/or firm managers. Efficient contracting dictates that when the state and corporate insiders' propensity to expropriate increase, the corporate insiders must co-invest more with other investors in equilibrium. These risks are country-specific because, subject to the constraints and trade-off based on the country's characteristics such as history, law, location, political ideology and economic development, those who control state activities can establish, enforce, and break rules affecting investors' payoff. When the risks of expropriation are high, it is optimal for the corporate ownership to be highly concentrated. Such concentrated ownership impedes economic growth, risk-sharing, financial development, and the beneficial impact of financial liberalization. As such, a model with market frictions, such as poor investor protection, explains that the beneficial impact of financial globalization is smaller than it would be in model without such frictions. Stulz (2005) argues that country attributes are still critical to financial decision-making because of what he calls "*twin agency problem*" (described below). Twin agency problem explains the the practice where corporate insiders (major shareholders and

managers) and rulers of sovereign states purse their own interest at the expense of outside (minority) investors.

Stulz (2005) notes that corporate insider appropriate private benefits and expropriate outside investors because they are always looking to maximize their own private benefits instead of putting the value maximization of outside investors as their primary objective. Such activity by the insiders generates "*the agency problem of corporate insider discretion"*. Such benefits could take any form, from overspending on corporate plans (receiving outside commission/financial bribes) to outright theft. The magnitude of the cost of extracting private benefits significantly depends on the rights granted and the degree to which these rights are protected by the state. When such costs of benefiting corporate insiders at the expense of outside investors are high, diffused ownership is dominated over concentrated ownership as co-investment by the corporate insiders aligns their benefits better with minority share holders and hence, limits expropriation of the outsider (minority) shareholders.

Similarly, the "*agency problem of state ruler discretion*" is associated with the expropriation activities of the state. North (1981) discriminates between a predatory and contracting theory of the state. With the practice of contracting theory the state makes it easier for private parties to enter into mutually beneficial contracts and the state acts as protector by enforcing these contracts. However, how well does the state perform depends on the level of country's endowments, on its level of financial and economic development, efficiency of political institutions and on the incentives enjoyed by the rulers. It is extremely difficult for a state to perform the role of protecting contruactual rights efficiently when anarchy and disorder prevail. Though the state has the power to fight anarchy and disorder, they may themselves abuse the power to maximize their own private welfare. By doing so, state affects the payoffs of investors and corporate insiders, benefiting some (corporate insiders) and hurting others (outside shareholders). By "state expropriation", this study refers to the action initiated by the state to improve their private welfare and negatively affect the return on corporate investments. Stulz (2005) documents that state expropriation can take the form of outright confiscation to formulating and imposing regulations that favours the current rulers. Such discretion of rulers who abuse their power and authority for their private benefits creates agency problem referred as

"*the agency problem of state ruler discretion*". When such agency problem is substantial it leads to inefficiency in the practice of corporate professional management and atomistic shareholder base. The widespread ownership structure becomes inefficient because mangers are able to reduce the risks of state expropriation by initiating activities that improves their own discretion and makes the effort of monitoring (by outsiders) their activities difficult. In such case, the managers become entrenched and therefore can take advantage of atomistic shareholders. In contrast, the controlling shareholders have far greater incentives to take action against state expropriation than the professional managers do and therefore ownership concentration tends to increase as the importance of *state ruler agency problem* becomes more prevalent. Stulz (2005) specifies wide range of state expropriation activities such as taxing the cash flows, confiscating assets, forbidding particular activities, or requiring bribes to acquire personal benefits. For technical details of the model please refer Stulz (2005).

Based on the model of "*twin agency problem*" Stulz (2005) shows how the agency problem could affect the decision of foreign investor in a pair country circumstance. Their model predicts that countries with poor governance have relatively lower proportion of wealth owned by foreign investors because corporate insiders have larger ownership of share in such countries. Similarly, countries with higher state expropriation have lower fraction of wealth owned by foreign investors, all else equal. This implies that as the investor protection environment improves, ownership becomes more atomistic and foreign investors share should increase. He also notes that foreign investors typically have portfolios that exhibit a number of biases suggesting many variables may turn out to be useful in explaining the portfolio they hold.

In a similar study Doige et al., (2007) differentiate between investor protection granted by the state and investor protection adopted by individual firms. They show that the extent to which individual firms select to improve upon investor protection is dictated by the state requirements of the costs and benefits of doing so. They claim that in countries with weaker legal development, it is expensive for firms to improve investor protection because the lack of institutional infrastructure and good governance in such countries is associated with higher political costs. They further add that in such countries the payoffs from improving governance are smaller because the capital markets lack the required depth and breadth. They find that there

is complementarity between county level investor protection and firm level governance. However, they also argue that as country gradually move towards financial globalization, the country characteristic are reduced increasing the incentives for good governance.

Further, as hinted earlier, there is extensive literature that relates important features of capital market to the differences in the legal protection accorded to investors from expropriation by the controlling shareholders and managers. For example, LLSV (1997) suggest that better protection of shareholders is associated with higher number of listed stocks, whilst Eleswarapu and Venkataraman (2006) show that with better investor protection regulations; stocks of listed firms enjoy larger turnover and higher liquidity. Others have reported that a strong legal framework for investor protection leads to: higher firm valuation relative to their book value (Claessens et al., 2002), higher dividend pay-outs (La Porta et al., 2000), widespread control of ownership (La Porta et al., 1999) and reduced managerial private benefits (Zingales, 1994 and Nenova, 2003).

In summary, if a country exhibits extensive expropriation of outside investors, it undermines the efficient functioning of a financial system. It therefore follows that if the quality of investor protection has positive influence on the ability of entrepreneurs to raise more capital then this should also influence foreign equity portfolio investors' decision in cross-country allocation. Thus, the quality and credibility of investor protection frameworks, among other factors, may explain why developed countries are better at attracting higher volumes of international equity portfolio investments than developing countries despite the evidence that most of the developing markets have been growing faster and offering higher equity yields (Bekaert and Harvey, 2003 and Kohers et al., 2006).

Bekaert and Harvey (2003) note that despite the announcement and implementation of financial liberalisation measures initiated by emerging markets there could be many barriers impeding foreign portfolio equity investments. Bekaert (1995) differentiates between three different kinds of barriers deterring foreign investments. First are the direct or formal legal barriers arising from different legal status accorded to domestic and foreign investors. However, whether removal of formal barriers helps attracting foreign investors is debatable. Studies (see Bekaert and Harvey, 1995; Errunza, 2001; Bekaert et al., 2003 and Hunter, 2006) demonstrate that indirect barriers

(2nd type of barriers) resulting from differences in available information, accounting standards and *investor protection* are also important determinants of foreign investments. The third type of barriers is the market specific risk factors, particularly related to emerging markets, such as liquidity risk, broad country risk and foreign exchange risk. Although Bekaert and Harvey (1995), Bekaert et al., (2002), and Bekaert and Harvey (2003) have done significant work in demonstrating how different barriers affect cost of capital, volatility and asset pricing issues, they do not directly test how the effectiveness and efficiency of investor protection affect foreign equity portfolio investment.

Drawing on the arguments describing the positive correlation between investor protection and capital market developments it seems that investor protection frameworks could be one of the potential drivers of foreign equity portfolio investments. However, evidence available in the current literature is scarce and findings are inconclusive as discussed below.

Dahlquist et al., (2003) show that there is a close association between corporate governance and the portfolio held by U.S. investors. They provide evidence that their estimate of shares held by controlling shareholders serves as proxy for investors' rights and show that U.S investors are more reluctant to invest in countries with weaker investor protection rights. Their study demonstrates that an improvement in investor protection increases the share of a country and of a firm in the free float portfolio (freely investable) held by U.S. investors. Similarly, Agarwal et al., (2005) also show that U.S. investor tends to invest more in countries with better investor protection measures However, Chan et al. (2005) demonstrate that foreign investors tend to be more influenced by stock market development and bilateral familiarity factors and investor protection does not play significant role.

Furthermore, empirical studies have also added novel dimension to the investor protection issues when it comes to foreign portfolio investment. Constructing a novel measure of exogenous growth opportunity based on a country's industrial price earning (PE) ratio and global PE ratio, Bekaert et al., (2007) indirectly reveal the importance of international investment in aligning with the growth opportunities. They suggest that higher the international investments received by a country higher are the chances of exploiting the growth opportunities. In their investigation,

they first employ a general measure of investor protection proxy, which they call broader *quality of institution* measure. The *quality of institution* measure is compiled from ICRG's overall political risk rating sub-components (see Table 4-2, page 108) and reflects corruption, law and order and bureaucratic quality. They find that the broader *quality of institution* proxy does not align with growth opportunity measure. However, when they use *investment profile*, a proxy that specifically measures and reflects government's attitude towards foreign inward investments capturing factors such as risk of expropriation/contract viability, payment delays and the ability to repatriate profits, they report significant positive relationship with growth opportunities. The overall measure of ICRG's political risk index, which is a composite measure and includes both, *quality of institution* and *investment profile*, is also highly significant. Consequently, they claim that the positive influence of political risk rating is not due to variable capturing broader *quality of institution* but is attributable to *investment profile*. Based on their findings, they further posit that their study is an indication that foreign investors may not heed to the overall broader *quality of regulation* but may be only concerned with specific aspects of regulation directly protecting their interest, i.e. *investment profile*. However, they do not empirically test this economic claim.

Similarly, Dahlquist et al., (2003) model U.S. investors' portfolio holdings and report none of the investor protection measures, accept for the *risk of expropriation* (investor protection measure specific to foreign investments), is significant. They conclude that U.S. investors' decisions are not affected by the level of investor protection rights as long as there is enough supply at their disposal to hold foreign equity.

With the objective of assessing the indirect claim of Bekaert et al., (2007) and re-assessing the conclusion reported by Dahlquist et al., (2003), our study employs the ICRG's *investment profile* measure as one of the variables to study the role *investment profile* on the country allocation decisions of foreign equity portfolio investors. The use of ICRG's measures is constrained by the unavailability of other proxies having time dimension.

In light of the previous discussion, this study tests the following thee hypotheses:

H_9 Higher levels of investor protection measures specifically related to foreign investment are associated with higher levels of FEPA.

The first hypothesis tests whether foreign investors are influenced by investor protection measures specific to foreign investments. Again, in line with existing studies, we use ICRG's *investment profile* as a proxy of investor protection specifically related to foreign investments.

H_{10} Higher levels of general investor protection measures are associated with higher levels of FEPA.

The second hypothesis tests whether foreign investors take account of the general investor protection measures when considering foreign investments. We use the *quality of institution* measure, constructed by ICRG (described in chapter 4), as the proxy of general investor protection measure.

H_{11} Countries adopting English common law attracts higher levels of FEPA.

Following LLSV (1997) we use the dummy taking the value one if countries follow English common law and zero otherwise. It is shown that countries following English common accords highest protection to outside investors (LLSV, 1997, 1998). We should find the regression coefficient associated with Enlgish common law dummy to carry postive sign.

3.6 Summary of findings

The findings of the study suggest that after controlling for host of confounding variables, investor protection rights, particularly those related to foreign investments have positive impact in attracting international equity investments. We conclude that foreign investors prefer investing in markets that have better investor protection frameworks safeguarding the interest of foreign investors. The evidence suggests that by improving the effectiveness and enforcement efficiency of legal protections accorded to foreign investors, higher level of foreign portfolio equity investments could be attracted. We discuss the detailed empirical findings in chapter 8.

3.7 What is the impact of foreign equity portfolio flows on global financial linkages of Asian emerging markets?

The impressive growth in foreign equity investments in emerging markets and the debate on the likely implications for their integration with the global equity markets has prompted intense research interest in this subject matter. The current credit crises caused by the high defaults in the US sub-prime market and its spill-over effects to other economies in both developed and developing part of the world have further highlighted the need to investigate the role of foreign institutional investors in emerging stock markets. Although there are a number of studies which provide evidence of increasing integration of emerging markets with the global markets (Syriopoulos, 2007; Chelley-Steeley, 2005 and Dungey et al, 2004), none have so far examined the role played by foreign investors on the long and short run financial linkages of emerging markets. In view of the global spread of current financial crisis and its likely implications for a number of emerging markets, it is both topical and theoretically desirable to understand the role and influence of foreign investors on the process of integration of emerging equity markets with the global markets. Similarly, as noted earlier, there has been intense debate about the destabilizing impact of portfolio flows, particularly in emerging markets. As such, within the limitation of data availability, the final empirical work of the thesis focuses on the role of equity portfolio flows on domestic returns and world returns for four Asian emerging markets.

This study draws inspiration from two main strands of the literature. The first one deals with integration of emerging equity markets with the global equity markets by investigating the correlation structure and comovements in returns. There is a growing body of research that provides evidence on the extent to which equity markets around the world have become integrated (see for example, Chang, 2001; Kanas, 1998, 1999; Kwan, et al, 1995; Masih and Masih, 1997; Corhay, et al, 1993, 1995, Dickinson, 2000; Gerrits and Yuce, 1999; Pymonen and Knif, 1998). Focussing on the global linkages of Australian equity market with equity markets of its major trading partners and using data prior to 1996, Roca (1999) examines the price linkages between the equity markets of Australia and other developed markets, particularly US, UK, Japan, Singapore and developing markets of Hong Kong, Taiwan and Korea. Their result only supports the short term dynamic linkages of the Australian equity markets with US and UK. Further, Dungey et al. (2004) reports that equity markets in Australia are influenced by shocks

common to all other markets around the world. Their study concludes that the U.S. market plays a significant role in explaining the Australian equity market's movement whilst Australia's domestic output has minimal impact on its own equity market. Yet in another investigation aimed at examining the linkages in stock indices amongst the US, European and Asia-Pacific developed markets, Hsin (2004) finds evidence consistent with extant findings of a strong linkage and transmission effects among the regional participants in Europe, such as Germany, Britain and France and Asia-Pacific markets of Japan, Australia, Hong Kong, and Singapore.

Evidence on integration of emerging equity markets with the developed markets is somewhat mixed. For instance, Chan et al. (1992) examine data for the Asian emerging markets and find that the markets are segmented. Similar assessment is further supported by Lamba (2005) who uses data for the period 1997-2003 from the South Asian emerging markets and concludes that most of the markets in his sample are segmented. Further, Bekaert and Harvey (1995) measure the degree of integration using equity returns and conclude that some countries have become less integrated over time. In contrast to the findings mentioned above, there are a number of studies including one by Jong and Roon (2005) which show that emerging equity markets have become more integrated with the developed markets. In another recent study, Tai (2007) examines Asian emerging market data and concludes that these markets have become integrated with world capital markets since the time when these markets were first liberalised. Soydemir (2000) investigates the co-movements relationship between developed and emerging market economies using the economic fundamentals and trade linkages as the basis. He concludes that Mexico and USA show stronger linkages whereas Argentina and Brazil exhibit sign of weaker association and attributes the differences to the trade flows. However, Soydemir does not consider the short-run dynamics and long run association of the trading activities of foreign investors, which is reported to be one of the key causes leading to the closeness of equity market (Errunza, 2001).

The second strand of literature deals with the dynamics of foreign investment flows and equity returns in emerging markets (see, Froot et al., 2001, Bekaert, et al., 2002, Richards, 2005). There are two main streams that flow from this body of research. The first seeks to enquire whether foreign equity investors are attracted by higher returns offered by foreign equity markets (see, Bohn and Tesar, 1996). The second attempts to investigate whether the impact of foreign equity

flows on stock prices is permanent or just temporary as a consequence of the 'price pressure' exerted by these flows (see, Bekaert, et al., 2002).

Despite the conjectures that foreign portfolio investors play an important role in increasing the global linkages (Errunza, 2001; Bekaert and Harvey, 2003 and Soyedemir, 2000), empirical evidence on the influence of foreign investors in the context of the global financial linkages of the Asian emerging markets is lacking. This paper fulfils the gap by bringing together these two strands of the literature and provides empirical evidence on the effect of foreign equity investment flows on the integration of the Asian emerging equity markets of India, Korea, Taiwan and Thailand with the global markets.[4] Most previous studies use foreign equity flow data up to 2002. There is information which suggests that quite a few of the emerging markets, especially those in Asia, have introduced significant changes in the foreign ownership restrictions and have raised the limits on foreign ownership since 2001.[5] Given this, there is a need to investigate the extent of the impact foreign equity flows have had on the global linkages of the Asian emerging equity markets in recent years. More recently, Li and Rose (2008) conducted a study using S&P's Emerging Market Data Base on 34 emerging markets. They use the ratio of global and investable indices to show the impact of foreign participation on extreme comovements for the Asia Pacific Economic Cooperation. They use copula model with constant and time varying extreme correlation models and find affirmative result on the extreme movements in the APEC equity markets.

Our study does not focus on extreme co-movements among these markets but on the role of foreign portfolio investor's trading activity on the long-run relationship and short-run dynamics with local equity markets. Our study not only shows the long run association (co-integration hypotheses) and short run dynamic linkages (feedback and price pressure hypothesis) of the emerging Asian equity markets with global counterparts but also provides evidence on the potential role played by foreign investors in driving the growth in the global linkages.

[4] Our choice of markets is restricted by the lack of availability of good quality daily data on other emerging equity markets.

[5] For instance, Taiwan increased the foreign equity ownership limit to 75% in 2000 from 50% in 1999 before removing any limit towards the end of 2000.

One of the reasons for relatively less research on this subject matter is that good quality high frequency data on foreign equity flows for emerging markets is not easily available. Thus previous research by Froot et al. 2001 uses proprietary data for equity flows from State Street Bank and Trust whilst Bakaert et al., 2002 have had to rely on monthly capital flow data for their research that involved 20 emerging markets. The foreign equity flow data in this empirical study uses the same source as the one used by Richards (2005) but with two significant differences. First, we use more recent data (from 2001 to 2007) so that the impact of more recent increases in the foreign equity ownership limits can be captured in the integration process of emerging equity markets. Second, unlike Richards (2005), instead of measuring integration with the US equity market, we use MSCI World Equity Market returns as a proxy for global markets because the foreign equity flow data from CEIC is aggregated and includes foreign investments from different countries including the US. Thus, our paper provides evidence with respect to the integration of emerging equity markets globally rather than with the US market alone. The data used on foreign equity investments is daily which allows us to investigate long-run stochastic equilibrium relationship as well as short-term dynamics. As our objective is to understand the impact of foreign equity investments flows not only on long-term basis but also on the short-run dynamics, the use of aggregated daily foreign portfolio investment flows rightly justifies the use of high frequency daily data. Also except Richards (2005), no other paper has used high frequency data in integration studies.

In view of above discussion, we test the following hypotheses:

H_{12} Foreign equity portfolio flows drive the global integration of the Asian emerging markets with the global equity markets.

H_{13} Foreign investors are "return chasers", i.e., flows are caused by changes in expected returns (i.e. feedback hypothesis).

H_{14} Increase in foreign equity portfolio flows raises domestic stock market price (i.e. price pressure hypothesis).

Our research has important theoretical and policy implications. The rolling correlation of the Asian emerging market equity returns with the world market returns has grown over the years (see Figure 9-1-Figure 9-4 page no.200). Further, the interest of foreign investors in these markets has also grown with time (see investment flow figures in Table 9-1 page no. 191). These developments should have significant impact on asset pricing and portfolio allocations. Historically, one of the main motivations for investing in emerging markets was that these markets had low correlations with developed markets. However, if the present magnitude and pace of foreign investments are sustained over time then the emerging markets would become fully integrated with the global markets. This may have detrimental effect on diversification of risk since emerging equity markets have long been viewed by international investors as segmented markets offering excellent diversification benefits to international investors (see Chatrath et al., 1996). Further, there is evidence that increased foreign equity flows seems to cause greater volatility in the emerging equity markets which is a matter of concern to the policy makers.[6] Thus, the impact of increasing foreign equity investment flows on the integration of emerging equity markets is of high interest to both academics and policy makers. This is particularly relevant since there is evidence to suggest that foreign investors appear to have short-term investment horizon and at the sign of the slightest of trouble, foreign equity portfolio investments tends to leave at a much greater pace than the pace at which it arrives in emerging markets (see, Bekaert et al., 2002).

Our study makes three important contributions to the existing literature. First, we extend the literature by investigating both the long and short-run dynamics of the impact of foreign equity investment flows on global integration of the selected Asian emerging markets. Second, we use more recent foreign equity flow and return data to capture the effect of increased foreign investment activity in emerging markets as a result of further relaxation of foreign ownership restrictions. Finally, unlike previous studies we use MSCI world return index that comprise

[6] There are several examples of interventions by policy makers concerned with the negative impact of foreign equity flows. For instance, Malaysia imposed capital controls in 1998 following the Asian financial crisis with an aim to control the excessive volatility that appears to have been caused by a rapid outflow of foreign capital. In December 2006, the Thai government tried to impose tough controls by requiring investors with more than $20,000 of investment to remain invested for a minimum period of one year or face severe penalties if this investment is removed within a year. However, the government had to reverse this decision following a steep fall in the stock market after shares suffered their worst daily fall in 16 years and closed down by 14.8%.

twenty-three stock markets of industrialized countries which is a better proxy for measuring the dynamics of global linkages.

3.8 Summary of findings

Our findings suggest that the foreign equity investment flows contain significant information in explaining the short-run dynamics and long-run relationship of the selected Asian emerging equity markets with the global markets. Our results are robust in terms of synchronization and statistical sensitivity of VAR based VEC and cointegration tests. We conclude that the rapid growth in the foreign equity flows is leading to greater integration of the Asian emerging equity markets with the global equity markets. This may have significant implications for pricing of assets and international portfolio allocations in the Asian emerging markets.

Chapter 4 Data

4.1 Foreign portfolio holdings

Drawing on the theoretical framework of Cooper and Kaplanis (1986) and following Chan et al., (2005), our main dependent variable is foreign equity portfolio allocation (weights) from country *i* into country *j* and is defined as

$$w_{ijt} = \log\left(\frac{FPH_{ijt}}{\sum_{j=1}^{36} FPH_{ijt}}\right)$$

Where w_{ijt} is the foreign equity portfolio allocation (FEPA) from country *i* into country *j* for the year *t* and FPH_{ijt} is the stock of foreign equity portfolio holding in USD million. Our bilateral data on the 36 recipient countries is from International Monetary Fund (IMF). The numbers of investor countries are 16 (Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, UK and USA).

In October 1997, IMF undertook a survey whereby 29 participating countries reported the position of portfolio investments, on bilateral country basis. This survey is named Coordinated Portfolio Investment Survey (CPIS). It is being conducted on annual basis since 2001 with more country joining the survey. The prime motive for undertaking the survey is to have better understanding of the global asymmetries in the reported balance of payment data, particularly those in portfolio investment. All participating countries are required to report a breakdown of their stock of portfolio investments, including portfolio equity investment (assets), by the country of residency of the non-resident issuer. This provides a detailed data on country-by-country foreign equity portfolio investments holding data. The data could be downloaded from the IMF's website. The choice of the countries is dictated by the availability of data points for the dependent and most importantly for the independent and control variables For example, no bilateral trade data were available for Taiwan. Also, no transaction cost data were available for China, Poland and Russia. Similarly, the trading costs measures we have used in this study are handpicked data from S&P's *global stock market factbook*. Trading costs data for the year 2001 are only reported for 40 countries out of which we have used for 36 countries. The rest of the countries are either off shore financial centres (such as Luxembourg) or there are not enough

data points for other control variables used in our study. As in other studies (Fidora et al, 2007) on international equity investment, we have not included Luxembourg in our dataset. Luxembourg is considered as an offshore financial centre and is related to the issue of third-country holdings and round-tripping. For example, for the year 2003 the total holding reported by German investors alone in Luxembourg was 152 billion whereas Luxembourg's total market capitalization was less than 40 billion.

We have made every attempt to make the panel data set as balanced as possible because estimations with highly unbalanced data set do not have best of the desirable properties. As such, although data for 1997 is also available, most of them are missing. Also, no data are available for the 1998-2000 periods compelling us to use the data set for the period 2001-2006, except some missing data points not reported in the IMF website. Most of the investments are from developed into other developed and developing countries with negligible investments from developing countries. This resulted in considering only developed markets as investor countries.

In terms of coverage of the survey, most of the financial market participants included in the survey, but not limited to, are the primary end-investors (e.g. banks, security dealers, pension funds, insurance companies, mutual funds, non-financial corporations, households) and primary custodians, who hold or manage securities on behalf of others. However, some caveats deserve due attention in using the data. Any investment below USD 500,000 is not reported. Also, some data despite being available may not be reported by a country due to confidentiality reasons.

Please refer to table 4.1 below which provides brief description and sources of all the variables used in all the empirical studies.

…….Insert Table 4-1 here, see page 103 …….

4.2 Transaction cost and FEPA

We test our transaction costs hypotheses (H_1, H_2, and H_3) using three different measures of country level transaction costs measures[7]. These measures are the country level yearly trading cost figures estimated and maintained by Elkins/McSherry (E/M) and reported in the yearly global stock market fact book of *Standard and Poor (S&P)*. E/M analyses global trading costs for 150 global institutions (pension funds, investment managers, banks and brokers) and provides estimates of the country level transaction cost figures for their use by international investors. E/M measures of country level transaction cost, which are based on an average transaction in USD for the particular country, comprise three components.

4.2.1 Commission (TC1) – for hypothesis H_1

The first is the average commission paid (TC1). According to Solnik and McLeavy (2004) commission represent payments made to brokers for allowing access to brokerage services and proprietary research resources for informational advantage. We use this variable to test the following hypothesis:

H_1 Countries with lower level of average commission attract higher level of FEPA.

4.2.2 Fees (TC2) - for hypothesis H_2

The second measure is the average fee paid (TC2) which includes any costs incurred for obtaining additional services, such as the post-trade settlement costs. It is worth mentioning that for UK, the buying fees is significantly higher because of the stamp duty. We have taken the average of the buy and sell costs (round trip trading cost) as investor pay more for buying but are compensated by paying significantly lower fee for selling. Using the fee measure, we test the following hypothesis:

H_2 Countries with lower average transaction fees attract higher level of FEPA.

[7] These are the only aggregate country level proxies for average transaction cost measures sourced from the literature and are available for country level studies in the panel data framework.

4.2.3 Market impact (TC3) - for hypothesis H_3

The third measure is the average cost of market impact (TC3). The S&P global stock market factbook (2007) defines market impact as the difference between the price at which a trade is executed and the average of the stock's high, low, opening and closing prices during the trade. More precisely, it is the average cost of trade versus the average price. Market impact is therefore defined as the difference between the actual execution cost and the price that would have been availed had the investor not been involved in the trading. We use this proxy to test the following hypothesis:

H_3 Countries with lower average cost of market impact attract higher level of FEPA.

4.2.4 Control variables

The first issue to control is the widely studied home bias phenomenon. It is evident from the literature (see French and Poterba 1991; Tesar and Werner, 1995; Karlsson and Norden, 2007, Chan et al., 2005 and Fidora, et al., 2007) that despite the theoretical prescription investors tend to significantly overweight their home market and therefore significantly deviate from holding the world market portfolio. Chan et al., (2005) note that if foreign investors over-weight their local market, then the remaining allocation that they invest should also be disproportionately lower suggesting home bias should be an important explanatory variable explaining the foreign allocation. As investor deviate from holding world market portfolio and overweight their domestic market, instead of using the world market portfolio as benchmark, following Fidora et. al., (2007) we construct the following bilateral home bias ($Hbias_{ijt}$) to control for the automatic impact of home bias on foreign equity portfolio allocation.

$$HBias = 1 - \log(w_{ijt}/BWT_{ij})$$

where *Hbias* is bilateral home bias observed by investor country *i* for country *j* at time *t*. BWT_{ijt} is defined as the benchmark weight and is computed as

$$BWT_{jt} = MC_{jt}/\left(\sum_{j=i}^{36} MC_{jt}\right)$$

where MC_{jt} is the market capitalization of the recipient or destination country *j* at time *t*.

The size of the capital market and level of stock market development have also been shown to affect international portfolio investments (Chan et al., 2005). We use the ratio of stock market capitalization to GDP as a measure of stock market development obtained from World Development Indicator of World Bank. We also include two broad country risk measures obtained from the Political Risk Group (PRS). The '*economic policy risk'* is measured on a scale of 0-50 points and captures five potential sources of economic risk (GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP and current account as % of GDP). The '*financial policy risk'* measure is also constructed on a scale of 0-50 and reflects five potential sources of financial risk components (foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity).

Agarwal et al., (2005) note U.S. funds tends to invest in open markets exhibiting stronger shareholders rights and legal frameworks. We have included a composite measure of investor protection measure sourced from World Bank Governance Indicator [*Investor protection (WBGI)*] controlling for two broader aspects of regulatory environment. The first is the regulatory quality based on the scale of 1-100 capturing the perceptions of local government's ability to formulate and implement sound policies effective for the private sector development. The second, also measured on a scale of 0-100, is the rule of law. The latter captures the perception of the extent to which agents show confidence and follow the rules of society, especially the quality of contract enforcement, property rights, the police and the courts. We aggregate both the investor protection measures and scale it by 0.5 yielding risk-rating scale of 0-100. Higher ratings indicate better investor protection rights and therefore greater confidence by foreign investors. The investor protection is expected to carry positive sign in our regression in line with existing studies (Bekaert and Harvey, 2003 and Agarwal et al., 2005) which show that investors prefer countries having better investor protection measure in place. However, in sharp contrast, other studies (Dahlquist et. al., 2003 and Chan et al., 2005) claim no relationship between investor protection and investment decision of foreign investors.

We also control for any capital control measure that a country might have imposed on inward foreign portfolio investment. As a proxy for the degree of financial liberalization (market integration) we have used the capital control intensity measure (*Equity market openness*) prescribed by Edison and Warnok (2003). It is constructed by taking the ratio of market capitalization represented by S&P/IFC investable indices, which correct for foreign ownership, to the market capitalization denominated by S&P/IFC Global Indices. The openness measure ranges from zero to one with one implying the total domestic market capitalization is freely open to foreign investors and zero completed closed market. Since these indices are only available for developing countries in the S&P Global stock market fact book, the ratios have been set to 1 for all developed countries. For more details, see Edison and Warnok (2003) and various issues of S&P Global stock market fact books (2001-2006). *Equity market openness* also represents time variation in the financial liberalisation process (De Jong, 2005) and is expected to display positive sign. Our equity market openness measure is based on the assumption that all the developed markets stocks are fully free floated, which may not be the case. Dahlquist et al., (2003) note that only a small portion of the market capitalization in most countries is available to international investors who are not controlling shareholder. They compute percentage of firms closely held for a number of countries and demonstrates it significantly explains U.S investors' home bias. We employ the variable (*closely held firms*) of Dahlquist et al. (2003) as percentage of closely held shares of market capitalization to complement the equity market openness and investor protection measure. This proxy captures the prevalence of '*closely held firms*, in countries with poor investor protection frameworks and is expected to yield negative coefficient.

Motivated by the use of gravity models in modelling international trade of securities discussed earlier, we also control for bilateral familiarity variables. It is highly likely that the bilateral investments are influenced by long-term bilateral relationship, geographic proximity and market familiarity. We include a language dummy (*Common language*) which takes the value of one if pair country shares a common language. Countries like United States, United Kingdom, Australia, New Zealand and India share common language (i.e. English). Similarly, we also include the distance (*Distance*) between the capital cities of the pair countries. On average, European countries are closer to each other with Australia and New Zealand being the furthest. Both variables are obtained from www.nber.org/~wei/data.html used by Subramanian and Wei

(2006). Chan et al., (2005) suggest that investors are more confident in holding stocks of foreign companies whose goods and services are well known to them. We add the bilateral trade (*Bilateral trade*) obtained from Bilateral Trade Statistics of IMF and is constructed by adding the logarithmic value of the pair country's total export and import. Countries such as United States, United Kingdom and Germany share the highest average bilateral trade. Most of the emerging countries score lower on this measure. All the bilateral measures controls for informational asymmetries that might exist between foreign and domestic investors. They predict the probability of information flow and measure the barriers that foreign investors encounter for seeking overseas information (see Chan et al, 2005 and Fidora et al, 2007).

Studies (Bekaert and Harvey, 2003; Solnik, 1974 and Errunza, 1988) show that by including foreign securities with lower stock market correlation relative to home country spans the efficient frontier to the upper left corner in the mean variance analysis framework. The lower correlation of foreign securities thus improves the risk return profile. It may be that investors take advantage of lower correlation and increase their allocation. Although the use of home bias significantly controls for diversification prospects (Chan et al, 2005 and Fidora et al, 2007), we also construct correlation coefficient for each pair country based on the six years of monthly total return index data and use the correlation coefficient (*Equity market correlation*) to control for diversification opportunities. Following the normative economics of mean-variance analysis, we expect the coefficient to carry negative sign, although almost all the existing studies show it to be weak predictor.

Following Gelos and Wei (2005), we also include a three-year moving average return (*Historical Return*) to capture the possibility that investors may prefer countries with higher historical returns, commonly referred as return chasing hypothesis or feedback hypothesis (Bohn and Tesar, 1996; Froot et. al., 2001; Richards, 2005; Bekaert et al., 2002 and Griffin et al., 2004). Following the return chasing hypothesis, we expect the regression coefficient on this variable to bear positive sign. However, again almost all existing studies finds this variable to be insignificant. We do not include withholding taxes following French and Poterba (1991) who show that there is no significant relationship between taxes and international investment. Also, following the withholding tax figures in S&P's Global stock market factbooks, we do not find

any significant cross sectional difference for the countries used in our study. For evidence, please refer to different editions of S&P Global stock market fact books (2001-2006).

4.3 Country-specific characteristics and FEPA

The second empirical study of the thesis uses bilateral foreign equity portfolio investment and different measures of country specific equity market characteristics along with host of other control variables, including time invariant country-specific, bilateral cross-country specific and time effects. The focus of the second empirical study is on the role of country specific equity market characteristics. We use five different variables to capture different country specific equity market features[8] and test the following five hypotheses (**H_4, H_5, H_6 H_7** and **H_8**):

4.3.1 Stock market development/size – for hypothesis H_4

We use the *stock market development/size* to test hypothesis number four (**H_4**). It captures the size and breadth of the equity market reflecting the significance of capital market in the economy. Although large markets may not necessarily function well and taxes may distort incentives to list companies, Levine and Zarvos (1998) remark that many studies (La Porta et al., 1997, 1998, 2000) use this measure as an indicator of stock market developmen. The assumption is that stock market size is positively correlated with the ability to mobilize capital and diversify risk. We obtained this proxy of stock market development from World Bank Indicator (WDI). Since this variable is very important in terms of capturing the characterisics of stock market development/size (see La Porta et al., 1997, 1998 and Chan et al., 2005) we have re-used it as a key variable for our current empirical study and test the following hypothesis:

H_4 Stock market development/size has positive influence on FEPA.

4.3.2 Market Liquidity – for hypothesis H_5

As noted earlier, following Bekaert and Harvey (2000), this study uses a micro-structural variable to capture the liquidity of the equity market (*Liquidity*), also known as market turnover ratio. Levine and Zarvos (1998b) state that turnover ratio complements *stock market development/size* measure as a large market may not be the most active one. For example, the value of stocks traded for Canada for the year 2006 is USD 1,290,246 million (market

[8] We also considered *number of listed companies scaled by total population* and *trade volume scaled by GDP* as alternative measures. However, because these measures are highly correlated with stock market development and the turnover ratio, we do not include them. However, when we run the bivariate regression, both these measures are highly statistically significant.

capitalization of USD 1,700,708 millions) with turnover ratio of 81%. For the same year, value traded for Sweden is almost half of Canada, i.e. USD 677,122 million (market capitalization of USD 573,250 millions) but the turnover ratio is 139%. We have incorporated the average value traded as a percentage of mean market capitalization sourced from different issues of global stock market factbook of *S&P*. Bekaert and Hodrick (2009) also claim that turnover is often regarded as an indicator of liquidity, although it can also reflect the arrival of information that instigates trades. Turnover has also been reported to be inversely related to costs of trading equities because high trading costs cause investors to trade less (see Levine and Zarvos, 1998a, b; Amihud and Mendelson, 1986 and Bekaert and Hodrick, 2009). The following hypothesis is tested using the *liquidity* proxy:

H_5 Higher equity market liquidity is positively associated with greater level of foreign equity investments.

4.3.3 Emerging market dummy – for hypothesis H_6

It is known (see Bekaert and Harvey, 2003 and Chan et al., 2005) that relative to their advanced counterparts emerging equity markets are not as well developed in terms of market breadth (size), and price/informational efficiency. In line with the discussion in chapter 3 (section 3.3.3) on stock market development issues in emerging markets, we use an *emerging market dummy* variable to further represent for the level of stock market development. The variable takes the value of one for emerging markets (following IFC/S&P classification) and zero for developed markets. We expect the coefficient to be negative as mentioned in following hypothesis:

H_6 Foreign investors prefer to underweight emerging markets.

4.3.4 Equity market volatility – for hypothesis H_7

We further add two additional variables capturing the equity and exchange rate volatility. The first variable we include is the three-year moving average cross sectional standard deviation (*Equity market volatility*) of the equity returns based on MSCI's monthly total return index for each country[9]. We test the following hypothesis:

[9] We also used the five-year moving average but the results obtained are similar in all regressions.

H_7 Foreign investors prefer to underweight markets with higher equity market volatility.

4.3.5 Exchange rate volatility – for hypothesis H_8

The second measure captures the potential uncertainty of returns in domestic currency due to movement in exchange rate. We use the three-year moving average standard deviation (*Exchange rate volatility*) based on monthly figures of trade weighted real effective exchange rate (REER) obtained from Bank of International Settlement (BIS). The trade weighted effective exchange rate is a superior indicator of the macroeconomic effects of exchange rates than purely a single bilateral rate (see Klau and Fung, 2006)[10]. The REER we use in this study is the nominal effective exchange rate (NEER) adjusted by relative consumer prices levels. The NEER is calculated as the geometric weighted average of a basket of bilateral exchange rates, which implies that variation in the REER incorporates both, developments in nominal exchange rates and the inflation differential vis-à-vis trading partners. The BIS REER basket comprises 52 economies, including the emerging markets.

Theoretically, if the Purchasing Power Parity (PPP) relationship holds then there should not be any risk to foreign investors arising from exchange rate movements as they will merely reflect inflation differentials (Solnik, 1974b). However, in practice, the PPP rarely holds, at least not in the short run, and therefore investor faces exchange rate risk not explained by inflation rate differentials between two countries (Solnik, 1974b; Sercu, 1980 and Adler and Dumas, 1983). In a recent study, Carrieri et al., (2006) note that it is more appealing to use REER than nominal exchange rate because inflation rates are generally non-random and working with nominal exchange rate does not reflect the true effect of exchange rate risk. Since REER measures are based on the combined effect of changes in the inflation differentials and changes in nominal currency value, they are a better measure because they capture the true effect of exchange rate risk arising from the deviation of PPP. Further, Carrieri et al., (2006) conjecture "…using changes in the real exchange rate helps overcome possible complications due to fixed exchange

[10] Although the use of REER could be justified in light of the existing studies, we also employed the NEER calculated as the geometric weighted average of a basket of bilateral exchange rates. However, our results remain unchanged. Also, instead of the three year moving, we also used five year moving average but obtain similar results which are not reported here.

rate regimes or discrete changes in nominal exchange rates due to devaluations or currency peg management (p.514)". They also argue that nominal exchange rate index may confound with other information, particularly for emerging markets. It is difficult to be sure, whether the nominal exchange rate risk measure captures deviation from the PPP or other factors. Hence, REER captures the actual real exchange rate risk not explained by changes in inflation rate differential. We test the following hypothesis and expect the variable to carry negative regression coefficient.

H_8 Foreign investors tend to underweight markets with higher real exchange rate volatility.

4.3.6 Control measures

We breifly describe the controls here as they have been extensively discussed in section 4.2.2. The first control we use is the home bias effect as defined earlier. We also use a composite measure of transaction cost comprising of three different components of yearly trading cost figures maintained by Elkins/McSherry (E/M) and documented in the yearly Global stock Market Factbook of *S&P*. E/M measure of total trading cost is composed of three sub-components. Similarly, as described earlier, we also use the two broad country risk measures obtained from the Political Risk Group (PRS), the '*economic policy risk'* and the '*financial policy risk'* measures of International Country Risk Guide (ICRG).

We also include a composite measure of *investor protection (WBGI)* measure sourced from World Bank Governance Indicator as described earlier. Next we control for any capital control measure that a country might have with regard to foreign portfolio investment and include capital control intensity measure (*Equity market openness*) constructed by Edison and Warnok (2003). Following Dahlquist et al., (2003) we also include the variable (*closely held firms*) as percentage of closely held shares of market capitalization to complement the equity market openness measure. As noted earlier, this measure is expected to capture the prevalence of closely held firms in countries with poor investor protection rights and expected to carry negative coefficient.

We also control for bilateral familiarity factors by adding a language dummy (*Common language*) which takes the value of one if a pair country shares a common language. Similarly,

we add the distance (*Distance*) between the capital cities of a pair country and include the bilateral trade (*Bilateral trade*) obtained from Bilateral Trade Statistics of IMF. Further, we use the correlation coefficient (*Equity market correlation*) to control for diversification. Finally, we also include a three-year moving average return (*Historical Return*) to control the return chasing behaviour of foreign investors.

4.4 Investor protection and FEPA

Although panel data set offers a number of advantages, most of the investor protection measures used in the literature lack time dimension. Therefore, out of the three measures used in our study, two of them are obtained from *The Political Risk Services Group's* International Country Risk Guide (ICRG). ICRG provides monthly ratings for political, economic and financial risks for large number of countries assigning ratings to each component and sub-component of the three types of risks. The ratings are developed from 22 underlying variables. The highest number of points indicates lowest potential risk with lowest point (0) indicating highest potential risk. The maximum point assigned to a particular component is preset within the system depending on the importance (weighting) of that component to the overall risk for the country. ICRG personnel collects information on economic, financial and political risks and assesses them for assigning risk points for each individual risk component. The political ratings are solely based on subjective analysis of the collected political information whereas economic and financial risk components' ratings are based on objective data. These indexes are forward looking measures and capture the potential risks. Many researchers have used these ratings (see La Porta et al., 1998; Chan et al., 2005; Gelos and Wei, 2005 and Bekaert et al., 2007 among others) as country level investor protection proxies.

Two of the three investor protection measures used in this study are from the sub-components of overall political risk ratings as shown in the Table 4-2. The purpose of the political risk rating is to provide a common platform for assessing the political stability in countries covered by ICRG. The risk rating comprises 12 components with each component's rating based on pre-set questions. In our study, we use the annual average based on the monthly ratings for the respective year. The third measure is a dummy variable used by La Porta et al., (1998) who show that English common law system provides better legal protection to shareholders compared to the German and French civil law systems. We use a legal dummy taking the value of one for common law countries and zero otherwise. Detailed descriptions of the investor protection measures are as follows:

…….Insert Table 4-2 here, see page 108 ……

4.4.1 Investor protection- IPI (Investment Profile) - for hypothesis H_9

Out of the 12 sub-components of ICRG's political risk rating, we use the aggregate of three components as measure of investor protection (*investment profile*) reflecting government's attitude toward foreign inward investment (see Bekaert et al, 2007 and Table 4-2). The *investment profile* rating, based on the scale of 0-12, reflects PRS's assessment of the quality and enforcement efficiency of three sub-components of political risk: (i) contract viability or risk of expropriation (ii) payment delays and (iii) repatriation of profits. As shown in Table 4-2, each subcomponent is scored on a scale of 0 - 4, with zero being highest potential risk to 4 reflecting very low potential risk. Increases in the ratings indicate improvement in the establishment and enforcement of regulations related to foreign investments.

Jensen and Meckling (1976) point out that the yield on cash flows from investment projects cannot be taken for granted as insiders of the firms may use these resources for their own benefits hurting outside or minority investors. Jensen and Meckling define financial claims as contracts that give outside investors, such as shareholders and creditors, claim to the cash flows. Similarly, these contracts also provide them rights to exercise their power, such as the right to change directors, force dividend payments, impede operations benefiting insiders at the cost of outside investors, sue directors and claim compensations and liquidate the firm and receive the proceeds. These rights to contract viability are protected and even specified by legal system. Contract laws deal with privately negotiated arrangements, whereas company, bankruptcy, and securities laws prescribe the rights of corporate insiders and outsider investors. Many studies claim that investor protection laws and the quality of their enforcement by the regulators and courts are essential elements of corporate governance and finance (La Porta et al., 1997, 1998). When legal rights are extensive and well enforced by regulators or courts, investors are more willing to finance firms. In contrast, when the legal systems do not protect outside investors, corporate governance and external finance do not work well. Similarly, risk of expropriation to foreign investors is the risk of "outright confiscation" or "forced nationalization" imposed by the state, particularly a potential risk in emerging markets,

Risk of payment delays is concerned to the hold-up in export payment and is extensively used by international investors as a time dimension measure of investor protection. Repatriation risk is

the risk of making profit or capital captive by the government, particularly during crisis or distress circumstance[11].

We use investment profile measure to test the following hypothesis:

H_9 Higher level of investor protection measures specifically related to foreign investments are associated with higher levels of FEPA.

4.4.2 Investor protection -IPII (Quality of Institutions)

Quality of institutions or general measure of investor protection comprises three sub-components of ICRG's political risk rating components. The three components are: (i) corruption, (ii) law and order and (iii) bureaucratic quality (see LLSV, 1998 and Bekaert et al., 2007, for details).

ICRG posits that corruption may pose a threat to foreign investments because it may distort the economic and financial environment, affect the efficiency of government and business, encourage placement of incumbents on the basis of political connection rather than ability and create inherent instability in the political system, thanks to unhealthy competition for power by corrupt authorities. The most common types of risks in this category are demand for excess payments and bribes for official paper works, exchange control, tax assessments etc. Corrupt practices impede the effective running of foreign enterprises, diminish the confidence of foreign investors and may compel investors to withdraw or withhold investment.

ICRG assesses law and order separately. Each component of law and order is assigned maximum of three points. The subcomponent *law* is an assessment of the strength and impartiality of the legal system. The *order* subcomponent is an assessment of popular observance of the law. A country may score high (3) rating for quality of law in terms of its judicial system but may score very weak (0) if the law is ignored without being sanctioned effectively. ICRG (2008) claims that the strength and quality of bureaucracy acts as a shock absorber which tends to minimize the

[11] For example, Malaysia imposed capital control in 1998. Brazil prohibited convertibility of local foreign currency during December 2001 and multinationals were forced to export food and bullion incurring heavy liquidation costs.

risk of policy instability when government changes. ICRG assigns high points (maximum of 6) to countries where the quality of bureaucracy is strong and efficient enough to govern without drastic changes in the policy or interruptions in government services. In low risk countries, the quality of bureaucracy is somewhat autonomous from high degree of political influence and exhibits well established mechanism of recruitment and training. Countries scoring poorly on this measure (minimum zero) may lack the cushioning effect because a change in government tends to be traumatic for policy formulation and other administrative functions. For further details, please refer to PRS's ICRG methodology. We use this measure to test the following hypothesis:

H_{10} Higher levels of general investor protection measures are associated with higher levels of FEPA.

4.4.3 Investor protection III (Common English Law)

Our third variable used as a proxy of investor protection is borrowed from La Porta et al., (1998). They show that English common law system provides highest legal protection rights to shareholders, while German and French civil law system the least. We use a *Legal Dummy* taking the value of one for English common law countries and zero otherwise. We use this dummy to test the following hypothesis:

H_{11} Countries adopting English common law attracts higher levels of FEPA.

4.4.4 Control measures

As in the first two empirical works, we control for stock market development/size, emerging market dummy, market liquidity, equity market volatility, exchange rate volatility, transaction costs, economic policy risk, financial policy risk, equity market openness, closely held firms, common language dummy, bilateral trade, distance, equity return correlation, historical returns and time effects. The controls are already explained in the previous sections.

4.5 Impact of foreign equity portfolio flows on global financial linkages of Asian emerging markets

The fourth empirical study uses daily data in our analysis for a sample period of six years beginning 1 January 2001 to 30 March 2007. The proxy for global return index is calculated from MSCI global total return index, a composite index of 23 developed markets. [12] Similarly, the MSCI total return emerging market indices denominated in US$ are also used for four Asian emerging markets, i.e. for India, Korea, Taiwan, and Thailand. Our choice of emerging markets was restricted because of the lack of availability of daily net equity portfolio investment data for other emerging equity markets. A further reason is that a considerably long period has elapsed since these countries opened up their equity markets for foreign investments. Therefore, it is both timely and appropriate to investigate the short and long run influence of foreign equity investments given the rapid increase in the investment flows in more recent periods. The MSCI indexes are obtained from DataStream international and net daily foreign equity portfolio flows data are sourced from CEIC emerging market database.

[12] Since our Net Foreign Equity Investment (NFEI) data represents total of all foreign portfolio investments, we use the MSCI world index as proxy of global equity returns.

Table 4-1: Data description and sources

First Three Empirical Studies: Determinants of Foreign Equity Portfolio Holdings (2001-2006)

Dependent Variable

Variable	Description	Source
w_{ijt}	w_{ijt} is the foreign equity portfolio allocation (weights) from country *i* into country *j*. It is constructed as the ratio of portfolio holdings from country *i* into country *j* to the total portfolio holding reported by investor/source countries.	Co-ordinated Portfolio Investment Survey - International Monetary Fund
First Empirical Chapter: TC and FEPA - Key Independent Variables		
TC1	Average commission paid based on the average traded stock price in USD. These costs represent the estimate of country level commission cost paid to the brokers for allowing access to brokerage services and research resources.	Maintained by Elkins/McSherry and reported in the yearly Standard and Poor Global Stock Markets Factbook.
TC2	Average fee paid based on the average traded stock price in USD. These are estimate of the country level additional costs paid to compensate for additional services, particularly post-trade settlement costs.	Maintained by Elkins/McSherry and reported in the yearly Standard and Poor Global Stock Markets Factbook.
TC3	Average market impact cost based on the average traded stock price in USD. The S&P global stock market book (2007) defines market impact as the difference between the price at which a trade is executed and the average of the stock's high, low, opening and closing prices during the trade.	Maintained by Elkins/McSherry and reported in the yearly Standard and Poor Global Stock Markets Factbook.

Second Empirical Chapter: CSEMC and FEPA - Key Independent Variables

Stock market development/size	The size of the capital markets and level of stock market development. It is constructed as the log ratio of stock market capitalization to GDP.	World Bank's World Development Indicator
Liquidity	The average value traded divided by mean market capitalization.	Standard and Poor Global Stock Markets Factbook
Emerging market mummy	Serves as a proxy of stock market development/size and market efficiency. Takes value 1 for emerging markets as classified by S&P IFC.	Standard and Poor Global Stock Markets Factbook
Equity Market Volatility	Cross sectional standard deviation of the stock returns for each country used as proxy of potential total stock market risk. It is constructed based on three year moving average monthly total return index in USD	Morgan Stanley Capital International
Exchange Rate Volatility	Three year moving average standard deviation of bilateral trade weighted Real Effective Exchange Rate (REER) sourced from Bank of International Settlement. The REER used in this study is the nominal effective exchange rate (NEER) adjusted by relative consumer prices levels. The NEER is calculated as the geometric weighted average of a basket of bilateral exchange rates. The BIS REER basket includes 52 economies, including the emerging market economies. For more details, please see Klau and Fung (2006).	Bank of International Settlement

Third Empirical Chapter: Investor protection and FEPA - Key Independent Variables

IPI (Investment profile)	Investor profile is constructed on a scale of 0-12 rating. The rating of the investor profile is determined by PRS's assessment of three components: (i) contract viability or risk of expropriation (ii) payment delays; and (iii) repatriation of profits. Each subcomponent is scored on a scale with zero being very high potential risk to four reflecting very low potential risk. Increase in this rating indicates improvement in the effectiveness and enforcement of regulations specifically related to foreign investments.	Political Risk Services' International Country Risk Guide
Quality of institution (IPII)	Quality of institutions or general measure of investor protection comprises three sub-components of ICRG's political risk rating components: (i) corruption (ii) law and order and (iii) Bureaucratic Quality	
Legal Dummy	1 for countries following common English Law and 0 otherwise.	La Porta (1998)

Control Variables for first three empirical studies

Home Bias	*Home Bias* is bilateral home biased observed by host or investor country *i* for country *j* at time *t.* It is constructed as Home bias =1-log(w_{ijt}/BWT_{ij}). Where BWTijt is defined as the benchmark weight and is computed as BWT_{jt}=MC_{jt} / $\sum MC_{jt.}$ MC_{jt} is the market capitalization of the recipient or host country *j* at time *t.*	Co-ordinated Portfolio Investment Survey - International Monetary Fund and Standard and Poor Global Stock Markets Factbook
Economic policy risk	Economic policy risk is measured on a scale of 0-50 points and which captures five potential sources of economic risk (GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP and current account as % of GDP). The economic policy risk ratings are solely based on objective economic data ICRG collects and then uses a fixed scale to translate particular statistics into risk points.	Political Risk Services Group's ICRG

Financial policy risk	Financial policy risk measure is also based on a scale of 0-50 and captures five potential sources of financial risk components (foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity).	Political Risk Services Group's ICRG
Investor protection (WBGI)	A composite measure of investor protection measure. This variable is composed of two broader aspects of regulatory environment. The first is the *regulatory quality* based on the scale of 1-100 capturing the perceptions of local government's ability to formulate and implement sound policies effective for the private sector development. The second which is also measured on a scale of 0-100 is the *rule of law*. The latter captures the perception of the extent to which agents show confidence in and follow the rules of society, especially the quality of contract enforcement, property rights, the police and the courts. Both these variables have been aggregated and scaled by 0.5 to produce a rating of 0-100. Increase in rating denotes improvement in investor protection rights .	World Bank Governance Indicator - World Bank
Equity market openness	This measure is constructed by taking the ratio of market capitalization represented by S&P/IFC Investable Indices, which correct for foreign ownership, to the market capitalization represented by S&P/IFC Global Indices. This variable ranges from 0 to 1 with 1 indicating completely open market to foreign investors	Standard and Poor Global Stock Markets Factbook
Closely held ownership	Percentage of closely held shares of market capitalization	Dahlquist et al. (2003)
Common Language	Language dummy which takes the value of 1 if pair country shares a common language.	Subramanian and Wei (2006), www.nber.org/~wei/data.html
Bilateral Trade	Log bilateral trade data measured as the log of the total import and export reported by investor country *i.*	Bilateral Trade Direction - IMF
Distance	The log distance between the capital cities of the pair countries	Subramanian and Wei (2006), www.nber.org/~wei/data.html
Equity Return Correlation	Equity market return correlation coefficient for each pair country based on the six years monthly total return index data.	Morgan Stanley Capital International

Historical Return	Three year moving average historical log return	Morgan Stanley Capital International
Fourth Empirical Chapter - Variables (1 January 2001 - 30 March 2007)		
Domestic return index	log daily returns from 1 January 2001 to 30 March 2007 for India, Korea, Taiwan and Thailand.	Morgan Stanley Capital International
World return index	MSCI global total return index which is a composite index of 23 developed markets.	Morgan Stanley Capital International
Net foreign equity investment	Daily net foreign equity portfolio flows.	CEIC Data Company Ltd - A product of ISI Emerging Markets

Table 4-2: Decomposition of ICRG's Political Risk Components

Panel A: Overall Political Risk Components

Sequence	Component	Points (Max)
A	Government Stability	12
B	Socioeconomic Condition	12
C	Investment Profile	12
D	Internal Conflict	12
E	External Conflict	12
F	Corruption	6
G	Military in Politics	6
H	Religious Tension	6
I	Law and Order	6
J	Ethnic Tensions	6
K	Democratic Accountability	6
L	Bureaucracy Quality	4
TOTAL		**100**

Panel B: Investment Profile: Investor Protection Measures Specific to Foreign Investment

Sequence	Sub-Component	Points (Max)
C	Contract Viability/Expropriation	4
C	Profit Repatriation	4
C	Payment Delays	4
TOTAL		**12**

Panel C: General Investor Protection Measure

Sequence	Components	Points (Max)
F	Corruption	6
I	Law and Order	6
L	Bureaucracy Quality	4
TOTAL		**16**

Chapter 5 Methodology

Our study utilizes panel and time series methods. We use two different econometric frameworks. For the first three empirical studies, we utilize the panel data models explaining determinants of foreign equity portfolio allocation (FEPA). For the final empirical study, we use the vector error correction (VEC) model. The following sections describe both methodological approaches in detail.

5.1 Panel Data Models

Given the wide cross sectional differences and temporal variations in FEPA, we employ panel data regression models. A panel data framework allows us to utilize both cross-section and time series data as explained in equation 5-1.

$$y_{ijt} = \propto + \beta_1 x'_{1,jt} + \beta_2 x'_{2,ijt} + \epsilon_{it} \quad i = 1,..,16 \; and \; j = 1,..,36 \; and \; t = 1,\ldots..,6 \qquad 5\text{-}1$$

Where, *i* represents investor country, *j* the recipient country and *t* denotes time. *ij* represents the cross section or bilateral cross-country dimension and time *t* the time series dimension. α is an intercept term. $x'_{1,jt}$ represents the country *j* specific variables and $x'_{2,ijt}$ denotes the bilateral cross-country factors. For simplicity, we denote both the x_s by x_{it} (*i* representing both, *i* and *j*) and the associated coefficients by β. Our interest is on the robust and efficient estimations of the K × 1 vector β of the following model

$$y_{it} = \alpha + \beta x'_{it} + \epsilon_{it}, \quad i = 1,\ldots..,N \; and \; t = 1,\ldots,T \qquad 5\text{-}2$$

Before discussing the choice of the models for estimation purpose, it is worth exploring the advantages of using panel data relative to purely cross sectional or time series methods.

5.2 Advantage of panel data framework

A number of econometricians have listed the benefits of using panel data. Hsiao (1985, 1986), Klevmarken (1989) and Solon (1989) describe the following benefits of using panel data:

5.2.1 Controlling for unit specific effect or individual heterogeneity

Every cross section unit in the panel data set, i.e. individuals, firms, states or countries are heterogeneous. Econometric models using purely cross section or time series data, which are unable to control these individual effects, runs the risk of obtaining biased estimates (see Moulton, 1986, 1987).

For example, if the data set includes individual firms, we are not able to observe factors like individual management philosophy or style, which are firm specific and time invariant but may be correlated with the dependent variable. Let us demonstrate the effect of unit specific factors using a state level empirical example. Baltagi and Levin (1992) model consumption of cigarette as a function of lagged consumption, price and income across 46 American states for the year 1963-88. They claim that in addition to the time varying variables, there could be state-specific and time invariant variables influencing the level of consumption. However, the latter are difficult to observe. For example, religion and education could be unobserved variables which may not change materially over time and the exclusion of these variable leads to bias in the resulting estimates.

Similarly, if we are using country as our cross section units, each country may differ in terms of their colonial history, financial institutions, religious affiliations, political regimes etc. In case of pair country data set, some pairs may enjoy special relationship which does not change over time because of their common language, common colonial history, similar historical legacy (e.g. pair of common wealth countries) etc. In the literature, the unit specific effect is also called fixed effect as shown in the following model

$$y_{it} = \alpha_i + \beta x'_{it} + \epsilon_{it}, \quad i = 1, \dots, N \; and \; t = 1, \dots, T \qquad 5\text{-}3$$

Note that subscript i on the intercept. Each of the intercept term α_i is different for each individual, country, or pair-countries data structure and is generally known as fixed or unit specific effect. In estimating such model, we would ideally want the error term to be pure white noise with $E\ (\varepsilon_{it}, x_{it}) = 0$. Assuming we have controlled for all the time variant variables, the

coefficients are unbiased if $E\ (\alpha_i, x_{it}) = 0$ for all i. In such case we assume that the intercepts are different for different individuals but they are random drawings from a distribution with mean μ and σ_α^2. In the panel data literature, such estimates are estimated using random effect model because the individual effects α_i are treated as random. The error term in the random effect model is composed of time invariant individual effect α_i and the remainder component ϵ_{it} is uncorrelated over time and is written as:

$$y_{it} = \mu + \alpha_i + \beta x'_{it} + \epsilon_{it} \qquad 5\text{-}4$$

where μ denotes the intercept term.

However, if $E\ (\alpha_i, x_{it}) \neq 0$ for any *i*, then α_i is captured by the error term and therefore the estimates are biased. As such, if we are not able to control for unit specific effects, which do not vary over time, we run the risk of obtaining biased estimates. Panel data set-up resolves the problem by using dummies for each unit specific effect or employing the more commonly used fixed effect estimation.

The choice of fixed or random effect model depends on the assumption of α_i, i.e. whether α_i is treated as fixed parameters to be estimated or as random drawings. Panel data models are either estimated using fixed or random effects assumption. We extensively discuss these models in section 5.3 and 5.4 below.

5.2.2 Less collinearity and higher efficiency

Baltagi (2003) notes that time series data are plagued by collinearity problems. For example, in the above case of cigarette consumption, income and price have been shown be highly collinear in aggregate time series for the USA. However, the addition of cross section units adds significant information mitigating the problem of collinearity. Similarly, in our case when we consider only a single investor country, most of the variables are highly collinear. However, inclusion of 16 investor countries highly reduces this problem adding significant additional information allowing the estimation of the estimates more efficiently. To illustrate the problem,

let us consider the following general expression for the variance of OLS estimator of as single coefficient β_k in a multiple regression framework with an intercept.

$$V(b_k) = \frac{\sigma^2}{1-R^2}\,\frac{1}{N}\left[\frac{1}{N}\sum_{i=1}^{N}(x_{ik}-\bar{x}_k)\right]^{-1}, \quad k = 2, \ldots . K, \qquad 5\text{-}5$$

where R^2 is the squared multiple correlation coefficient between x_{ik} and other explanatory variables (i.e. R^2 from regressing x_{ik} upon the remaining regressors and a constant). If R^2 is close to one, x_{ik} can be closely approximated by the linear combination of all other variables and the variance of b_k will be large. However, if there is enough variation in x_{ik} and the sample is decently large resulting in smaller error variance, a large R^2 may not create problem. In fact, there are two forms of information in the panel data set and that can be decomposed into variations between individual units (between variations) and variations within (temporal variations) individual units. Because we are using both the variations in $x_{it,k}$ i.e. the *between variation* represented by *i* and the *within variation* represented by *t*, we ensure more reliable estimates are yielded. We provide such decomposition of our data set and describe it in section 5.6 (page 122).

Verberk (2009) shows that because panel data sets are larger than pure cross-section or time series and the explanatory variables vary over both dimensions (individuals and time), estimations are more accurate than those obtained using time series or a cross section approach. He further notes that even if the sample sizes are identical, panel data set results in more efficient estimators than using a series of cross-sections (where different cross units are used for each period). The following illustrates the point. Let us postulate the following random effects model, which includes only the time dummies i.e.

$$y_{it} = \mu_t + \alpha_i + u_{it}, \qquad 5\text{-}6$$

Where each μ_t is an unknown parameter corresponding to the population mean in time *t*. Let's suppose we are not interested in the mean μ_t in a particular period, but the change of μ_t, from

one period to another period. In general, the variance of the estimator for $\mu_t - \mu_s\ (s \neq t), \hat{u}_t - \hat{u}_s$, is given by

$$V\{\hat{u}_t - \hat{u}_s\} = V\{\hat{u}_t\} + V\{\hat{u}_s\} - 2\,\mathrm{cov}\,\{\hat{u}_t, \hat{u}_s\} \qquad 5\text{-}7$$

with $\hat{u}_t = \frac{1}{N}\sum_{i=1}^{N} y_{it}\ \ (t = 1, \ldots., T)$. In most cases when the panel data is used, the covariance term will be positive. For instance, in case of the random effects assumptions, it equals $\frac{\sigma_\alpha^2}{N}$. However, if we use two independent cross sectional data sets, different period will have different individuals and hence the covariance will be zero. Hence, if we are interested in analysing the changes from one period to another or wish to use the information on the same unit over different period, a panel data set will result in more efficient estimators than a series of cross-sections. Clearly, at an intuitive level, the panel data set should provide more information because not only we are able to use the cross sectional variations but also we can use the *within variation* of all the units over the period considered in the data set. Hence, any change in the independent variable may also affect the change in dependent variable and such temporal information is also used in panel data estimation.

5.2.3 Panel data provides internal instruments

Verbeek (2009) argues that in many cases where panel data is applied, there is no need to look for external instrument in case the variable is suspected to be endogenous or subjected to measurement error. This is particularly useful in dynamic models when one of the independent variables in lagged value of the dependent variable. Similarly, in the practice, most the studies (see Gelos and Wei, 2005) have used one-year lag to resolve the reverse causality problem, particularly if the data is of yearly frequency and is in line with the theoretical intuition. We have followed a similar approach in our study.

5.3 Fixed effect estimation

The most common estimation methods used in the panel data set up are the fixed effect and random effect models. We first describe the technical details of the fixed effect model followed by the random effect. Most of the discussion follows from Verbeek (2009). The fixed effect

model is a static linear model that assumes that the intercept terms (i.e. the unit specific effects) varies over individual units, i.e.

$$y_{it} = \alpha_i + x'_{it}\beta + u_{it}, \quad u_{it} \sim IID\ (0, \sigma_u^2) \qquad 5\text{-}8$$

The assumption of the above model is that all the x_{it} are independent of u_{it} . We can project this in the usual regression approach by including *N* number of dummies for all the individual units. That is,

$$y_{it} = \sum_{j=1}^{N} \alpha_j d_{ij} + x'_{it}\beta + u_{it}, \qquad 5\text{-}9$$

where $d_{ij} = 1$ if $i = j$ and 0 if otherwise. Hence, we have N number of dummy variables in specification 5-9 where the parameters $\alpha_1 \ldots\ldots\ldots \alpha_N$ and β can be estimated by ordinary least squares. Specification 5-9 is called the *least square dummy variable (LSDV)* and the estimator as *LSDV estimator*. However, if there are high number of individual units, as it is in our case (more than 500), it is unattractive to report all the regressors. This problem can be resolved by using a simple transformation process. It is shown that the same estimator β could be obtained if the above specification is run in deviation from individual means. What this means is that when we deduct each of the *K* variables from their individual means, we get rid of all time invariant variables i.e. all the dummies which varies over individuals but not over time. Let us first denote equation 5-9 in their mean form.

$$\bar{y}_i = \alpha_i + \bar{x}'_i\beta + \bar{u}_i \qquad 5\text{-}10$$

where $\bar{y}_i = T^{-1}\sum_t y_{it}$ and $\bar{x}_i$ and $\bar{u}_i$ are also defined in similar way. Now if we deduct equation 5-10 from equation 5-9, we get

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)'\beta + (u_{it} - \bar{u}_i). \qquad 5\text{-}11$$

Regression 5-11 is the model in deviations from the individual means. As the mean of the time constant variable is same, the model does not include any of the individual effect α_i. Such

transformation yielding the model 5-11, which is the deviation from their individual means, is called *within transformation*. The estimated β using ordinary least square is called the *within estimator* or *the fixed effect estimator*. This estimator is the same as the LSDV estimator as estimated in equation 5-9 and is given by:

$$\hat{\beta}_{FE} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)\,(x_{it} - \bar{x}_i)' \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)(y_{it} - \bar{y}). \qquad 5\text{-}12$$

The above estimated parameter $\hat{\beta}_{FE}$ is unbiased if it is assumed that all x_{it} are independent of all u_{it}. Additionally, if normality of u_{it} is imposed, the estimator $\hat{\beta}_{FE}$ is also assumed to follow normal distribution. Similarly, for consistency, the requirement is

$$E\{(x_{it} - \bar{x}_i)u_{it}\} = 0 \qquad 5\text{-}13$$

The above condition implies that if $E\{x_{it}u_{is}\} = 0$ for all s, t, we refer x_{it} as strictly exogenous, which means that the variable is not allowed to depend on current, future and past values of error term. However, in many applications this assumption is too restrictive, particularly in our case. For example, it is well known in the literature that foreign investment has beneficial effect on the institutions and market developments and therefore current value of institutional and market development variables could possibly be correlated with past error terms. We have addressed using practical solution prescribed in the literature and is discussed in the empirical chapters.

The covariance matrix of $\hat{\beta}_{FE}$, under the assumption that u_{it} is i.i.d. across individual units and time with variance of σ_u^2, is given by

$$V\{\hat{\beta}_{FE}\} = \sigma_u^2 \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)\,(x_{it} - \bar{x}_i)' \right)^{-1} \qquad 5\text{-}14$$

Equation 5-14 implies that unless *T* is large, the standard OLS estimate of the covariance matrix will underestimate the true variance because the error covariance matrix is singular (as the *T* transformed errors of each individual add up to zero) and the variance of $u_{it} - \bar{u}_i$ is (*T*-1)/$T\sigma_u^2$ instead of the usual σ_u^2. The estimator of σ_u^2 , which is consistent, can be obtained by from the sum of the squared residuals from the within estimator, scaled by *N* (*T-1*). As such, if we define

$$\hat{u}_{it} = y_{it} - \hat{\alpha}_i - x'_{it}\hat{\beta}_{FE} = y_{it} - \bar{y}_i - (x_{it} - \bar{x}_i)'\hat{\beta}_{FE},$$

we can now estimate σ_u^2 as

$$\hat{\sigma}_u^2 = \frac{1}{N(T-1)} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{u}_{it}^2 \qquad 5\text{-}15$$

Verbeek (2009) notes that under weak regularity conditions, the fixed effects estimators are asymptotically normal and therefore the usual inference procedures, like the *t* and Wald test, can be used. As seen from the above equation, the fixed effects model uses the 'within variation'. It explains to what extent y_{it} differs from $\bar{y}_i$. The assumption on the parameter of β implies that a change in x has the same (ceteris paribus) effect, whether the change is measured from one period to other or from one individual to another. Hence, it is important to understand that the parameters in fixed effect estimation is identified only through the within dimension of the data.

5.4 Random effect estimation

In multiple regression analysis, it is generally assumed that all the factors affecting the dependent variable but not included in the model are captured by the error term. In the panel data set-up the individual effect α_i is then part of the error term and is assumed to be identically and independently distributed over individuals. If we use the random effect model, the general specification can be written as

$$y_{it} = \beta_0 + x'_{it}\beta + \alpha_i + u_{it}, \quad u_{it} \sim IID(0, \sigma_u^2); \;\; \alpha_i \sim (0, \sigma_\alpha^2), \qquad 5\text{-}16$$

where $\alpha_i + u_{it}$ is the composite error term composed of the individual effect assumed to be time invariant and the remainder component is assumed to be uncorrelated over time. This implies that all the correlation of the error term over time is attributed to the individual effect. In addition, we impose the assumption that α_i & u_{it} are mutually independent and are independent with x_{js} (for all *j* and *s*). These assumptions ensure that the OLS estimators from 5-16 are unbiased and consistent. The structure of the error components implies that the composite error term $\alpha_i + u_{it}$ exhibits a particular form of autocorrelation (unless $\sigma_\alpha^2 = 0$). This implies that the routinely computed standard errors are incorrect and therefore a more efficient (GLS) estimator could be obtained by exploiting the structure of the error co-variance matrix.

In order to derive the GLS estimator, let us first note that for any individual *i* all the error terms could be stacked as $\alpha_i \iota_T + u_i$, where $\iota_T = (1,1, \ldots \ldots 1)'$ of dimension *T* and $u_i = (u_{i1}, \ldots . u_{iT})'$. The covariance matrix of the vector is (see Hsiao, 2003, section 3.3)

$$V(\alpha_i \iota_T + u_i) = \Omega = \sigma_\alpha^2 \iota_T \iota_T' + \sigma_u^2 I_T, \qquad 5\text{-}17$$

where I_T is the T-dimensional identity matrix. We can use this to derive the generalised least square (GLS) estimator of the parameters in (5-16). Using the omega matrix we can transform the panel data by pre-multiplying the vectors $y_i = (y_{i1}, \ldots \ldots, y_{iT})'$, etc., by Ω^{-1}, which is given by

$$\Omega^{-1} = \sigma_u^2 \left[I_T - \frac{\sigma_\alpha^2}{\sigma_u^2 + T\sigma_\alpha^2} \iota_T \iota_T' \right] \qquad 5\text{-}18$$

Equation 5-18 can also be written as

$$\Omega^{-1} = \sigma_u^2 \left[\left(I_T - \frac{1}{T} \iota_T \iota_T' \right) + \psi \frac{1}{T} i_T \iota_T' \right], \qquad 5\text{-}19$$

where

$$\psi = \frac{\sigma_u^2}{\sigma_u^2 + T\sigma_\alpha^2}$$

Note that $I_T - (1/T)\iota_T\iota_T'$ transforms the data in deviations from individual means and $(1/T)\iota_T\iota_T'$ takes the individual means. Thus the GLS estimator for β can be written as

$$\hat{\beta}_{GLS} = \left(\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)' + \psi T\sum_{i=1}^{N}(\bar{x}_i - \bar{x})(\bar{x}_i - \bar{x})'\right)^{-1} \times \left(\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i) + \psi T\sum_{i=1}^{N}(\bar{x}_i - \bar{x})(\bar{y}_i - \bar{y})\right), \quad 5\text{-}20$$

where $\bar{x} = (1/(NT))\sum_{i,T} x_{it}$ is the overall average of x_{it}. From equation 5-20, it is easy to see that if $\psi = 0$ the random effect estimator is effectively the fixed effect estimator. Verbeek (2007) notes that because the $\psi \to 0$ when $T \to \infty$, the fixed and the random effect estimation produces almost identical parameters in case of large *T*. However, if $\psi = 1$, the random effect estimation reduces to simple OLS estimation (and Ω is diagonal).

Referring to the general formula for the GLS estimator, it can be derived that

$$\hat{\beta}_{GLS} = \Delta\hat{\beta}_B + (I_k - \Delta)\hat{\beta}_{FE} \quad 5\text{-}21$$

Where

$$\hat{\beta}_B = \left(\sum_{i=1}^{N}(\bar{x}_i - \bar{x})(\bar{x}_i - \bar{x})'\right)^{-1}\sum_{i=1}^{N}(\bar{x}_i - \bar{x})(\bar{y}_i - \bar{y}) \quad 5\text{-}22$$

is the *between estimator* for β. It is simply the OLS estimator in the model for individual means, i.e. $\bar{y} = \beta_0 + \bar{x}_i'\beta + \alpha_i + \bar{u}_i, \;\; i = 1, \ldots\ldots, N.$

Here the matrix Δ is called the weighting matrix and is proportional to the inverse of the covariance matrix of $\hat{\beta}_B$ (see Hsiao, 2003, section 3.4 for details). The GLS estimator is thus a matrix-weighted average of the between estimator and the within (fixed effect) estimator. The weight depends on the relative variances of the two estimators (the higher the accuracy, the greater the weight).

The between effect estimator ignores the time series dimension in the data set. The GLS estimator is the optimal combination of the within estimator and the between estimator and hence is relatively more efficient than either of the two estimators. The OLS estimator when $\psi = 1$ is also a linear combination but is not the most efficient one, implying the GLS is superior estimator when competing in terms of efficiency. Now if we impose the independence of all explanatory variables with u_{it} and α_i, random effect estimators are unbiased. It is also consistent estimator for N and T or both, tending to infinity, if it also holds that $E(\bar{x}_i u_{it}) = 0$ and most importantly $E(\bar{x}_i \alpha_i) = 0$. Both these conditions are also required for the between estimator to be unbiased and consistent.

A more convenient way to obtain the GLS estimator is to show that the random effect GLS estimator is the OLS estimator in transformed model and given by

$$(y_{it} - \vartheta\bar{y}_i) = \beta_0(1 - \vartheta) + (x_{it} - \vartheta\bar{x}_i)'\beta + \upsilon_{it}, \qquad 5\text{-}23$$

Where $\vartheta = 1 - \psi^{1/2}$ leading to an error term which is i.i.d. over individuals and time leading to more efficient estimator those of the OLS. What we again note from the above equation is that if $\psi = 0$, it leads to fixed effect estimation ($\vartheta = 1$). What the above equation denotes is that a fixed proportion of the mean is subtracted from the data to obtain the transformed model.

The variance components ($\sigma_u^2 \; and \; \sigma_\alpha^2$) which makes the ψ are unknown in practice. In such case we have to use the feasible GLS (FGLS) whereby the unknown variances are consistently estimated in the first step. For the σ_u^2, we can use 5-15 and for between regression, the error variance is $\sigma_u^2 + (1/T)\,\sigma_\alpha^2$ and can be estimated consistently by

$$\hat{\sigma}_B^2 = \frac{1}{N}\sum_{i=1}^{N}\left(\bar{y}_i - \hat{\beta}_{0B} - \bar{x}_i'\hat{\beta}_B\right)^2 \qquad 5\text{-}24$$

where $\hat{\beta}_{0B}$ is the between estimator for β_0. The consistent estimator for σ_α^2 can now be obtained as

$$\hat{\sigma}_\alpha^2 = \hat{\sigma}_B^2 - \frac{1}{T}\hat{\sigma}_u^2 \qquad 5\text{-}25$$

As usual, this estimator can also be adjusted for degrees of free correction deducting K+1 regressors from the denominator of 5-24. The resulting FGLS estimator is referred as the random effect estimator for β (and β_0) denoted as $\hat{\beta}_{RE}$, also known as Balestra-Nerlove estimator. The covariance matrix of the $\hat{\beta}_{RE}$ is given by

$$V\left(\hat{\beta}_{RE}\right) = \sigma_u^2\left(\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)' + \psi T(x_i - \bar{x})(x_i - \bar{x})'\right)^{-1} \qquad 5\text{-}26$$

Equation 5-26 shows that the random effect estimator is more efficient than the fixed effect estimator as long as $\psi > 0$. The gain in the efficiency is due to the use of the between variation $(x_i - \bar{x})$.

5.5 Robust inference

The random and fixed effect models assume that the unit specific effect α_i captures all correlation between the unobservables in the different periods. This implies that the u_{it} is uncorrelated with individuals and time. If the exogeniety assumptions of the x_{it} is imposed, the presence of autocorrelation in error term does not affect the consistency of the standard

estimator. However, it implies that the standard errors are no longer correct and this invalidates the hypotheses tests leading to misleading inferences. One way to correct such standard error, without imposing any assumptions on the structure of covariance matrix, is to adjust the standard error for general form of hetoroskedascity and autocorrelation. In panel data language this is usually referred as the panel-robust or cluster-robust covariance matrix and can be applied for the fixed and random effect models. For technical details on how the correction is made please see Verbeek (2009, chapter 10, section 10.2.6).

Petersen (2006) advocates the use of panel-robust standard errors clustered by individuals for sufficiently large *N*. In all our random and fixed effect estimations, the standard errors are corrected for general form of hetoroskedascity and auto-correlation.

5.6 Summary and choice of the models

Given the nature of our panel data and types of models discussed above, we revisit the treatment of the error components and briefly summarize the choice of the models for our study. The error component can be decomposed into following three sub-components:

$$\varepsilon_{it} = \alpha_i + \lambda_t + u_{it} \qquad 5\text{-}27$$

where α_i denotes the unobservable time invariant country specific effect or bilateral cross-country effect, λ_t denotes the unobservable time effect and u_{it} is the remaining stochastic disturbance term. As noted earlier, based on the assumption of α_i and λ_t, literature provides different model choices. In case of *random, between* and *OLS* estimation, if $\alpha_i \sim IID(0, \sigma_\alpha^2)$, $\lambda_t \sim IID(0, \sigma_\gamma^2)$ *and* $u_{it} \sim IID(0, \sigma_u^2)$ are independent of each other and if x_{it} is independent of α_i, λ_t, and u_{it} for all *i* and *t*, then regressions could be estimated using the two-way *random, between* or the simple *OLS* estimation. The reason we call it two-way model because we assume that even the time effect is uncorrelated with the regressors. The random effect approach to estimating the β puts the individual country effect and time effect into the error term under the assumptions that the individual effects are orthogonal to x_{it}. It further takes accounts for the implied serial correlation in the composite error term using the GLS solution as shown above. This implies that

the random effect estimator is more efficient than the OLS estimator and also because it uses both within and between variation, is also more efficient than the *between effect* estimator exploiting only the between dimension of the data. Consequently, the optimal choice when competing for efficiency is the random effect model.

However, in many applications the main purpose of using panel data is to allow the individual effect to be arbitrarily correlated with x_{it}. For cases where dataset has a small number of cross section units, the usual approach of taking care of individual effects and time effects is to model the individual effects explicitly using dummies for each cross-section unit and employing dummies for each period. Our data offers a large number of cross section units and therefore we have not considered using this approach as it becomes practically infeasible to report hundreds of parameters. Another alternative is the use of the fixed effect model, which removes all time invariant individual effects since the model uses within transformation approach as detailed above. Fixed effect model allows the individual effect to be correlated with the x_{it} and mitigates any bias (see the technical details in the previous sections and refer Baltagi, 2003 & Wooldridge, 2002). The robustness in fixed effect model, however, comes at a cost since time constant variables need to be excluded. In our case, some variables such as emerging market dummy, logarithmic distance between capital cities and common language dummy are time constant variables. Furthermoer, fixed effect estiamtion does not take account of the information supplied by the between variation in the data set

Given the constraints of fixed effect model discussed above, we estimate most of our regressions using random effects model. Further, as suggested by Wooldridge (2002), the fixed effects model is not appropriate where the key variables do not exhibit significant variation over time. We compute a general approximation of the *between and within* variations for our variables. Defining the cross-country specific or group mean for any variable y_{it}

$$\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T_i} y_{it} \qquad \text{5-28}$$

y_{it} can be decomposed into 2 orthogonal components:

$$y_{it} - \bar{y} \;=\; (y_{it} - \bar{y}_i) \;+\; (\bar{y}_i - \bar{y}) \qquad 5\text{-}29$$

$$=\quad \textit{within} \quad +\ \textit{between}$$

where $\bar{y} = (\sum_{i=1}^{N} \sum_{t=1}^{T_i} y_{it}) / (\sum_{i=1}^{N} T_i)$

N is the number of cross section units and T_i is time dimension for y_{it}. The corresponding decomposition of the sum of squares is:

$$\sum_{i=1}^{N}\sum_{t=1}^{T_i}(y_{it} - \bar{y})^2 \;=\; \sum_{i=1}^{N}\sum_{t=1}^{T_i}(y_{it} - \bar{y}) + \sum_{i=1}^{N}\sum_{t=1}^{T_i}(\bar{y}_i - \bar{y})^2 \qquad 5\text{-}30$$

Overall Variation = *Within Variation* + *Between Variation*.

Between and within variations in our dataset are shown in Table 5-1. The first three columns show the overall, *between and within* variations (standard deviation) for all variables. The fourth column shows proportion of *between variations* (ratio of square of *between* standard deviation to square of overall standard deviation) and the fifth column indicates *within variations* (ratio of square of within standard deviation to square of overall standard deviation).

…….Insert Table 5-1 here, see page 129 ……

The figures in Table 5-1suggest that except for market impact, equity market volatility, exchange rate volatility, and historical returns, all other variables exhibit significant *between* variations. Furthermore, as explained earlier, we are unable to use the dummies with fixed effect model. This constrains us to employ random effect model in most of our estimations. In our random effect models, although we are unable to control time invariant pair-country effects, we are able to include all observed control variables and the time dummies. Since the random effect model

utilizes both, the *within and between* country variations, it is more efficient than the fixed effect model. Wooldridge (2003) further notes that under the random effects assumption the estimator is consistent and asymptotic normal as the cross sectional units (*N*) gets larger with constant time dimension (*T*). In our case, the number of *N* is over 550 with *T* of only 6 years. Given the results in Table 5-1, we use random effect model in all the specifications containing dummy or time invariant variables. However, in order to make our study more robust, we also use the *fixed effect model* only including time variant variables and the *between effect model* to ignore the effect of temporal dimension for the sake of robustness. We also report the test statistics of the standard *Hausman* and *Breusch-Pagan* unit specific tests (results footnoted) justifying the use of fixed effect model on statistical ground. For technical details of the tests, please refer Wooldridge (2002).

5.7 Co-integration and vector error correction model

We take a non-structural approach for investigating the impact of foreign equity investment flows on the short and long run dynamics of Asian equity markets with the global markets.[13]

We use the cointegration and 'vector error correction' model. Cointegration approach is widely used for examination of long-run stochastic relationship between equity markets (see Kearney and Lucey, 2004 for a comprehensive review). For short-run dynamics, the use of Vector Autoregression (VAR) analysis is quite widespread (see Froot et. al., 2001; Bekaert et al., 2002 and Richard, 2005).

5.7.1 Cointegration

We examine the long run relationship using VAR-based cointegration approach proposed by Johansen (1988) and Johansen and Juselius (1990). The Johansen-Juselius (JJ) approach is preferred because it is considered superior to regression-based approach suggested by Engle and

[13] Use of a non-structural approach in linkage studies is advocated by Bekaert and Harvey (2000) who suggest that because of lack of theoretical basis, non-structural approach should be preferred in conducting portfolio flow studies. Further, Tesar and Werner (1995) report that even in the relatively open markets, the substantial increase in cross border flows do not comply with the theoretical foundations of optimal portfolio theory due to home bias effects.

Granger in 1987.[14] The JJ approach uses maximum likelihood estimates and allows testing and estimation of more than one cointegrating vector in the multivariate system without requiring a specific variable to be normalized. This way, the JJ test overcomes the problem of carrying over the errors from the first step into the second step commonly encountered in Engle and Granger's (1987) approach. Further, Johansen's method is independent of the choice of endogenous variable within a vector autoregression (VAR) framework. This enables testing for various structural hypotheses involving restricted versions of cointegrating vectors and speed of adjustment parameters using likelihood ratio tests. The general VAR equation can be rewritten as:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \ldots\ldots\ldots\ldots + A_p y_{t-p} + \varepsilon_t \qquad 5\text{-}31$$

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \Gamma_1 \Delta y_{t-2} + \ldots\ldots\ldots + \Gamma_{p-1} \Delta y_{t-p+1} + \varepsilon_t \qquad 5\text{-}32$$

$$\Delta y_t = \Pi y_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \qquad 5\text{-}33$$

Where:

$$\Pi = \sum_{i=1}^{p} A_i - I, \qquad 5\text{-}34$$

$$\Gamma_i = -\sum_{j=i+1}^{p} A_j \qquad 5\text{-}35$$

Since our objective is to investigate the long-run relationship, we will focus on the elements of matrix Π. If vector *y* contains m variables, matrix Π will be of the order m x m, with a maximum

[14] The Johansen-Juselius procedure resolves the problem of endogeneity in that we do not need to normalise the cointegrating vector on one of the variables as required in the Engle and Granger (EG) test (see Cheung and Lai, 1993).

possible rank of m (or full rank). Equation 5-33, except for the Πy_{t-p} term, is in the form of the traditional VAR with first difference. The Π term determines whether the system of equations is cointegrated, i.e., whether a long-run equilibrium relationship exists. The feature to note is that the rank of matrix Π is equal to the number of independent cointegrating vectors. If rank of matrix $\Pi = 0$, the matrix is null, i.e., all the elements in this matrix are zero, which implies no cointegration or a lack of a long-run equilibrium relationship and the error correction mechanism, Πy_{t-k}, therefore, does not exist. In determining the rank of matrix Π (number of cointegrating vectors), we calculate the characteristic roots or eigenvalues $\hat{\lambda}_i$ of Π. Johansen (1988) and Johansen and Juselius (1990) propose trace (λ_{trace}) and maximum eigenvalue (λ_{max}) test statistics to establish whether the characteristic roots are significantly different from zero. The likelihood ratio (LR) statistic for the trace test (λ_{trace}) is:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{m} \ln\left(1 - \hat{\lambda}_i\right) \qquad 5\text{-}36$$

Where $\hat{\lambda}_i$ are the estimated values of the characteristic roots (also known as eigenvalues) obtained from estimated Π matrix. The null hypothesis to be tested is that the number of cointegrating vectors is less than or equal to r against the alternative hypothesis that the number of cointegrating vectors is more than r. For example the null hypothesis $r \leq 0$ against alternative $r = 1$, $r \leq 1$ against alternative $r = 2$, and so forth. The 'maximum eigenvalue' test is used to evaluate the null hypothesis of r cointegrating vectors against the r + 1 cointegrating vectors. The LR test statistic is given by:

$$\lambda_{\max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \qquad 5\text{-}37$$

The computed values of λ_{trace} and $\lambda_{\max}$ statistics are evaluated using the critical values provided by Osterwarld-Lenum (1992). The optimal system lag length is determined by using the Schwarz Information Criteria (SIC). Specifically, the appropriate number of lags for each variable is

obtained by computing the SIC over different lag schemes within a range of 1 to 20 and by choosing the number of lags that yields the lowest value for the SIC.

5.7.2 Error correction representations

Vector Error Correction Model (VECM) is employed on the cointegrated return series as this provides us with an effective way to analyse the short-run relationship including causality and the speed at which the error is corrected for establishing the long-run relationship found in the cointegration analysis. If variables are cointegrated they tend to converge in the long-run despite short-run deviations. VECM examines this equilibrium relationship and provides a feedback mechanism, the error correction term, which gradually moves in tandem with the equilibrium relationship. VECM also provides the mechanism to identify the magnitude and length of information transmitted from one series to another through the system, referred as variance decomposition and impulse response function respectively. The VECM is employed on first difference of I(1) variables as shown below.

$$\Delta y_t = \sum_{i=1}^{m} \beta_{11} \Delta x_{t-i} + \sum_{i=1}^{m} \beta_{12} \Delta w_{t-i} + \beta_3 z_{t-1} + \mu_t \qquad 5\text{-}38$$

Equation 5-38 is a three variable model with y and x being return series and w being the net foreign equity investment. The other representations with Δx and Δw could be similarly presented. The cointegrating vector z_{t-1} is the error correction term which will be I (0) if the above series in their level term have long-run equilibrium relationship. This term corrects the short-term deviations and helps convergence of the series towards a long run equilibrium state. The parameter β_3 measures the speed of adjustment in the short-term deviations whilst β_{11} and β_{12} capture the short run causality. The lag length and coefficients are determined by OLS regression using the SIC criteria.[15]

[15] Lag length problem can be solved by alternative information criteria, such as AIC, SIC and HQIC. SIC embodies a much stiffer penalty than AIC whereas HQIC is somewhat in between. Although inefficient compared to other two criteria, we prefer SIC because it is strongly consistent. Hence, on the trade-off between consistency and efficiency, we prefer former to the latter.

5.7.2.1 Impulse response function

Impulse response function explains the responsiveness of one variable in the VAR framework to the shocks in its own as well as other variables. It explains the extent to which a unit shock in one variable in isolation of the others affects the movement in other variables. In each of the equation, one unit shock is applied to detect the change in the VAR system over time by representing the VAR as VMA (Vector Moving Average) representation:

$$Ri,t = b_{11}^{0}\,\varepsilon_{i,t} + b_{11}^{1}\,\varepsilon_{1,t-1} + b_{12}^{1}\,\varepsilon_{2,t-1} + \ldots\ldots\ldots \qquad 5\text{-}39$$

Where, b_{ij} are unit normalized innovation coefficients of impulse response function following the normalization by the Cholesky factor[16] and b_{11}^{0} is the simultaneous effect of a unit shock to $\varepsilon_{i,t}$. The contemporaneous innovation is stated in standard deviation form and have non-unit coefficient in contrast to its unit coefficients in the equation.

5.7.2.2 Forecast error variance decomposition

Previous research has shown that variance decomposition analysis is quite effective in examining dynamic interactions amongst economic time series (Lutkepohl and Reimers, 1992). Whilst the impulse response function traces the effects of a shock in one endogenous variable on other variables in the VAR, variance decomposition enables further analysis by decomposing the forecast error variance of domestic return index and net foreign equity investment that will provide us with a quantitative measure of the short run dynamic relationship among the variables. The variance decomposition thus offers greater insights on the relative significance of each random innovation that affects the variables in VAR by showing the proportion of changes in variance caused by a shock in its own lags and by shocks in variance of other variables as well as the magnitude of the effects.

[16] See Diebold (2004).

Table 5-1: Between and Within Variation

Variables	Standard Deviation			Proportion of between variations (%)	Proportion of within variations (%)
	Overall	Between	Within		
Commission	11.252	10.486	4.102	86.85	13.29
Fees	6.854	6.474	2.208	89.20	10.37
Market Impact	9.062	6.148	6.867	46.03	57.41
Turnover ratio	0.563	0.527	0.203	87.66	13.04
HBIAS	1.233	1.150	0.498	86.91	16.33
Portfolio allocation	2.234	2.196	0.548	96.66	6.01
Log of market development/size	0.662	0.596	0.287	81.08	18.78
Equity market volatility	0.231	0.101	0.209	19.20	81.64
Exchange rate volatility	0.350	0.285	0.204	66.33	34.03
Historical return	0.235	0.124	0.200	27.86	72.48
Emerging market dummy	0.500	0.500	0.000	100	0.00
Log bilateral trade	0.234	0.211	0.055	80.99	5.46
Log distance	1.107	1.104	0.000	100	0.00
Common language dummy	0.348	0.348	0.000	100	0.00
Equity market correlation	0.230	0.229	0.000	100	0.00
Economic development/policy risk	4.626	3.995	2.358	74.58	25.97
Financial policy risk	5.706	4.922	2.920	74.40	26.18
Investor Protection – world bank	0.447	0.444	0.058	98.93	1.71
Investment profile - ICRG	1.871	1.819	0.482	94.61	6.65
Quality of institution - ICRG	3.247	3.204	0.516	97.34	2.53
English common law dummy	0.416	0.416	0.000	100	0.00
Equity market openness	0.156	0.146	0.053	88.3	11.68
Closely held firm	19.344	19.328	0.000	100	0.00

Chapter 6 First empirical study: Transaction costs and FEPA

Our first empirical study focuses on the relationship between country level transaction costs and foreign equity portfolio allocation. We test the following hypotheses:

H_1 Countries with lower level of average commission attract higher level of FEPA.

H_2 Countries with lower level of average fees attract higher level of FEPA.

H_3 Countries with lower level of average market impact cost attract higher level of FEPA.

We first present the descriptive statistics of our dependent and independent variables. Although not as robust as panel regressions, descriptive analysis does provide useful information.

6.1 Statistics on FEPA and transaction costs

Table 6-1 presents the averages (over cross-section and time) of FEPA and transaction costs (in basis points) for all host countries (*j*) for the period 2001-2006. It is worth nothing from the figures in the first column that Peru received the lowest average foreign equity portfolio allocation (0.02%) whereas USA received highest (37.76%). In terms of the top ten ranking competing for FEPA, most are developed countries (USA, UK, Switzerland, Sweden, Japan, Italy, Germany, France, Finland and Canada) and the bottom ten mostly comprises developing countries (Argentina, Chile, Czech Republic, Malaysia, Peru, Philippines, Thailand and Turkey) with the exception of New Zealand and Portugal which also received relatively lower foreign equity portfolio investment.

…….Insert Table 6-1 here, see page 139 …….

Columns 3, 4, and 5 of Table 6-1 show the average of various components of transaction costs (i.e., commission, fees and market impact cost, respectively). Column 6 presents the total transaction costs (sum of commission, fees and market impact cost). In terms of total cost (column 6), it is evident that Japan has the lowest total transaction costs followed by USA,

Austria, Belgium, Canada, Australia, France, Germany, Italy, Sweden and Switzerland. Not surprisingly, all of these countries have relatively more developed equity markets. The univariate analysis provides prima facie evidence that generally lower transaction costs are associated with higher foreign portfolio allocations.

Table 6-2 shows correlation coefficients between different components of transaction costs. Except for TC1 (commission) and TC2 (fees) that are somewhat correlated (0.40), other combinations have lower or negative correlations. This suggests that multicollinearity is not a significant problem among the various measures of transaction cost.

…….Insert Table 6-2 here, see page 140 ……

6.2 Regression analysis

The analysis of the summary statistics presented in previous section offers good indication that countries with relatively lower transaction costs seem to attract higher equity portfolio allocation. To confirm this, we employ a number of regressions by including different variables that could potentially compete with transaction cost measures in explaining portfolio allocations. All significant coefficients are shown with asterisks and the test statistics are shown in parenthesis. Regression specification 6-1 includes home bias (*HBIAS*) variable in addition to each of the different components of transaction costs (TC1, TC2 and TC3) as independent variables. The results are presented in Table 6-3.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Cost_{jt} + \epsilon_{ijt} \qquad 6\text{-}1$$

As expected *home bias* is highly significant and bears the expected negative sign. Estimations show that one percent increase in home bias decreases bilateral portfolio holdings by nearly 1%. This finding is consistent with other studies (French and Poterba, 1999; Cooper and Kaplanis, 1994; Tesar and Werner, 1995, Lewis, 1999, Ahearne et al, 2004, Chan et al., 2005 and Fidora et al. 2007) and confirms existence of home bias in international portfolio allocations. However, after controlling for the home bias, all transaction cost measures are highly significant at 5%

level of significance. This shows that transaction costs have substantial effect on foreign portfolio allocations.

…….Insert Table 6-3 here, see page 140 ……

The above results may be biased since specification 6-1 excludes macroeconomic, institutional and bilateral control variables. Thus in regression 6-2, we include a number of control variables and the time dummies.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Cost_{jt} + \beta_3 . Controls\ and\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}2$$

Results in Table 6-4 show that the coefficient for *home bias* is still negative and statistically significant. Although, the magnitude of transaction costs coefficients is somewhat reduced, they remain statistically significant. The changes in magnitude are not surprising since inclusion of the control variables and time dummies mitigates any bias inherent in regression 6-1.

…….Insert Table 6-4 here, see page 141 ……

Next, we run a number of different specifications of the model to ensure that our estimates are robust. The outputs of different specifications of the model are shown in Table 6-5. We first discuss the results of the transaction cost measures followed by discussion about the impact of control variables.

6.3 All in one – Random effect

As multicollinearity amongst the different transaction cost measures is not a significant problem, we include all four transaction cost variables in a single regression and jointly estimate the coefficients via the following regression using random effect model:

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Costs_{jt} + \beta_3 . Controls\ and\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}3$$

The findings reported in Table 6-5 (column 2: All in one – RE) show that not only the coefficients for transaction cost measures are highly significant, but they also carry expected signs with improved R^2 of 82%. This suggests that each of the transaction cost measure has a distinct and statistically significant influence on foreign portfolio allocations.

…….Insert Table 6-5 here, see page 143 ……

6.4 All in one – Fixed effect

Our regression coefficients may still be suspected of being bias since each country may have its individual effect through the time invariant variables and time invariant pair-country bilateral effects, such as common colonial history, special bilateral treaty, favourite partner nation status, etc[17]. If this is the case then the unobserved time invariant variables may be correlated with the regressors and the estimates may be biased. We use the fixed effect model to address this issue. As discussed earlier, although fixed effect estimates are not as efficient as the estimates of random effect model, particularly where variables have lower temporal variation, it does account for of all the country specific and bilateral cross-country time invariant effects. As our transaction costs and other control variables have time dimension, we are able to use the fixed effect model using only the time variant variables. We run regression specification 6-4 using a fixed effect model:

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Costs_{jt} + \beta_3 . Controls\ and\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}4$$

The results reported in Table 6-5 (column 3: All in one - FE) show that the explanatory power of the model is reduced since all time invariant variables are not used. However, the reported goodness-of-fit of the fixed effect model is explained by the within transformation of the

[17] The Hausman test statistic, Chi-square = 41.01, also confirms that the coefficients estimated by the efficient random effect model are not the same as the ones estimated by the consistent fixed effects model. As such, on statistical ground, it is reasonable to use the fixed effect models as they always produce consistent results. In addition, the standard Breusch-pagan test for unit specific effect, Chi-square = 391 also confirms the estimates from random effect model are not systematic.

independent variables and cannot be interpreted in the usual way (see Wooldridge, 2003). All our key variables, i.e., commission, fees, and market impact cost variables remain statistically significant without any major change in either their statistical significance or signs.

6.5 All in one – between effect

In order to further make our study more robust we also run the between effect (BE) estimation. Verbeek (2009) notes that the BE estimation effectively discards the time series information in the data set and exploits the between dimension of the data (i.e. differences between individual cross section units). As mentioned earlier, it is determined using OLS in the regression of individual averages of the dependent variable and the individual averages of independent variables. We run the following regression using the BE estimation.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Costs_{jt} + \beta_3 . Controls + \epsilon_{ijt} \qquad 6\text{-}5$$

As shown in Table 6-5 (column no. 4: All in one – BE), all the transaction cost estimates are still statistically significant. The change in the size of the estimates are obvious because the regression only uses the between information in the data neglecting the time series information.

6.6 Free float home bias

The home bias *(HBIAS)* variable that we used is based on the assumptions that the all countries follow an open market policy allowing free entry and exit of foreign investors. However, despite vigorously pursuing liberalisation of financial markets, many emerging markets in developing countries have regulations that impede the free inflow and outflow of portfolio investments. Our measure of *equity market openness* does reflect this issue to considerable extent because it captures the level of restriction imposed on the ownership. To address the issue of free float securities, we construct a free float home bias (*F_HBIAS)* measure using the S&P IFC's freely investable market value index. Again, a caveat is worth noting here. The investable measure is only available for the markets in developing countries and therefore in our analysis we assume that developed markets are completely open for foreign investors. However, even if this may not be the case for some developed countries; the *closely held firms* variable included in our model

should be able to capture the effects of investment restrictions, if any. We run the following regression specified with freely floated *home bias* (*F_HBIAS*). The estimation outputs are reported in Table 6-5 (column 5: Free float home bias).

$$w_{ijt} = \alpha + \beta_1 . F\_HBIAS_{ijt} + \beta_2 . Transaction\ Costs_{jt} + \beta_3 . Controls\ and\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}6$$

Results suggest that the quantitative size of the *home bias* coefficient is slightly lower than in the previous specification. However, qualitatively it is still statistically significant. The transaction cost coefficients remain highly significant at the conventional 5% level.

6.7 Reverse causality

In our regressions, reverse causality may also be a potential problem. As noted in our introductory chapter, there is theoretical conjecture that the increase in the foreign equity investment develops the liquidity and informational efficiency of the market suggesting increase in foreign investments itself may have impact on the level of transaction costs. To overcome the potential endogeneity problem and following Gelos and Wei (2005), we use one-year lag value of all transaction costs variables in the following regression 6-7 and estimate with RE model.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt-1} + \beta_2 . Tran.\ Costs_{jt-1} + \beta_3 . Controls\ \&\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}7$$

As can be observed from estimates in Table 6-5 (column 6: One year lagged) the regression coefficients of the lagged values of transaction costs remain statistically significant. The magnitude of the estimates does change as they reflect lag rather than the level effect. Despite using lagged values, the transaction cost measures remain statistically significant confirming that transaction cost variables used in our estimations do not appear to suffer from reverse causality problem.

6.8 Major financial centres

Here we consider the possibility of international investors buying depositary receipts/global shares listed in major financial centres instead of investing directly in shares trading in the foreign equity markets. International investors may be tempted to use major financial centres because of the lower transaction costs (Warnock, 2002 and Bekaert and Hodrick, 2009). If this may be the case then our transaction cost estimates may be affected because our sample includes USA, UK and Japan, considered major financial centres where depositary receipts/global shares are listed and actively traded. To address this issue, we exclude USA, UK and Japan as the investor countries from our sample and run the following specification 6-8 using RE estimation.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Transaction\ Costs_{jt} + \beta_3 . Controls\ and\ Time\ dummies + \epsilon_{ijt} \qquad 6\text{-}8$$

As seen in Table 6-5 (column 7: No major investors), despite excluding USA, UK and Japan, the coefficients all transaction cost measures exhibit significant effect. This confirms that even after removing the effect of the major financial centres, transaction costs do seem to matter in the foreign portfolio allocation decisions.

6.9 Control variables

Most of the control variables have expected and consistent signs in the different specifications, except for few as seen from reported coefficients and associated test statistics in Table 6-5. As far as the S*tock market development/size* is concerned, all the estimates carry expected sign and is highly significant across all specifications. The results make sense since they indicate that foreign investors are keen to invest more of their money in countries with larger stock markets. Chan et al., (2005) also report similar assessment. Economic development and policy risk variable of ICRG, which captures the potential of economic policy, economic development and economic growth risk, is generally significant across specifications signifying that investors tend to overweight counties with potential lower economic policy risk. Similarly, the financial policy risk is also significant in most of the specifications. Again, it signifies that investor may avoid countries with higher level of financial risk. The findings on broad country risk measures are also consistent with previous studies (Gelos and Wei, 2005).

The broad measure of investor protection is significant across all regressions; accept for the *between effect* estimation model and *free float home bias*, implying the investor may not be willing to invest in countries which does provide higher level of investor protection rights. The issue of investor protection is debatable in the literature with mixed conclusion reported by a number of existing studies (Agarwal et al., 2005 and Chan et al., 2005). We explore the issue of investor protection in more detailed in our third empirical study. Further, the e*quity market openness* measure is significant across all specifications. As predicted, investors are more willing to invest in countries that are more open to foreign investors in terms of limit on foreign ownership (Stulz, 2001 and Dahlquist et al., 2003).

Similarly the significance of *closely held firm* variable indicates that investors tend to underweight countries where ownership is highly concentrated. Except for the equity return correlation, which is not significant in most of the specifications, all the bilateral gravity or information asymmetry variables are significant. The insignificance of equity return correlation has also be previously reported in the literature (see Chan et al., 2005) indicating that diversification opportunity may not be the only factor when considering foreign investments. The significance of common language across all specifications show investors are more willing to invest in countries sharing common language as this reduces the information asymmetry problem (Chan et al., 2005 and Fidora et al., 2007). Similarly, investors tend to invest more of their wealth in countries nearer than farther as reflected by the significance of distance variable. In addition, the significance of bilateral trade in all specifications is again a strong indication of the presence of information asymmetry problem when it comes to foreign investments. Investors are more willing to invest in countries having lower bilateral information asymmetry (see Portes and Rey, 2005; Chan et al., 2005 and Fidora et al., 2007). Finally, although they have expected sign, the *historical return* seems to be statistically insignificant across different specifications and hence, inconsistent with the return chasing or feedback hypothesis reported in the literature (Bohn and Tesar, 1996; Froot et al, 2001; Richards, 2005; and Bekaert et al, 2002; Dahlquist and Goran, 2004 and Griffin et al, 2004). Such findings are also reported by previous study (Chan et al., 2005) indicating that foreign investors do not solely base their country allocation decision on

the past historical returns, although this may not be true for emerging markets as reported in our fourth empirical chapter.

6.10 Chapter summary

In spite of the critical role of transaction costs there are not many papers that have explicitly examined its influence on international equity portfolio allocation decisions. Using bilateral cross-country equity portfolio holdings data and three direct measures of transaction cost for 36 host countries, we provide evidence that markets where transaction costs are lower attract greater equity portfolio investments. The results imply that future research on international portfolio diversification cannot afford to ignore the role of transaction costs and policy makers, especially in emerging markets, should encourage efforts to reduce transaction costs for attracting higher levels of foreign equity portfolio investments.

Table 6-1: Descriptive statistics (average over cross-section and time) on foreign portfolio allocation and transaction cost measures

Country	Portfolio	Commission	Fees	Market	Total
Argentina	0.0005	32.77	3.12	37.67	73.56
Australia	0.0146	23.13	2.08	8.85	34.06
Austria	0.0045	17.43	0.43	12.78	30.63
Belgium	0.0108	18.49	0.38	10.47	29.34
Brazil	0.0054	26.41	1.92	17.66	45.99
Canada	0.0171	18.78	0.51	13.05	32.35
Chile	0.0004	41.80	8.03	23.60	73.43
China	0.0041	NA	NA	NA	NA
Czech Republic	0.0009	41.39	6.57	10.09	58.05
Denmark	0.0056	19.38	0.22	15.92	35.52
Finland	0.0210	18.20	0.75	24.21	43.16
France	0.1081	17.90	0.64	9.44	27.98
Germany	0.0882	17.88	0.62	9.02	27.53
Greece	0.0028	31.77	15.35	12.45	59.57
Hungary	0.0020	42.36	4.99	11.17	57.96
India	0.0031	41.38	2.88	18.65	62.92
Indonesia	0.0101	45.53	10.80	15.96	72.29
Italy	0.0343	18.00	0.58	12.78	31.36
Japan	0.0794	13.53	0.20	6.42	20.15
Korea	0.0107	30.01	13.19	16.40	59.61
Malaysia	0.0015	34.75	6.63	15.49	56.87
Mexico	0.0042	27.30	0.27	10.48	38.04
New Zealand	0.0015	22.49	0.24	14.85	37.58
Norway	0.0057	19.00	0.25	13.26	32.51
Peru	0.0002	36.46	8.01	22.07	66.54
Philippines	0.0004	47.83	30.13	12.25	90.20
Poland	0.0017	NA	NA	NA	NA
Portugal	0.0027	18.53	0.67	14.74	33.94
Russia	0.0058	NA	NA	NA	NA
Sweden	0.0209	18.33	0.47	12.29	31.10
Switzerland	0.0533	17.74	0.95	10.42	29.11
Taiwan	0.0058	25.85	13.04	14.69	53.58
Thailand	0.0018	43.27	1.79	13.26	58.33
Turkey	0.0019	33.66	2.80	20.61	56.51
UK	0.1573	14.40	24.77	14.14	53.31
USA	0.3776	15.47	0.41	9.19	25.07

Table 6-2: Correlation among different transaction measures

	TC1	TC2	TC3
TC1	1.00		
TC2	0.40	1.00	
TC3	0.20	0.05	1.00

Table 6-3: Base model regressions

The dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t *($w_{i,j,t}$).* The independent variables are home bias (HBIAS) and the three measures of transaction cost in basis points (scaled by 100). TC1 denotes commission, TC2 fees and TC3 market impact.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2' . Transaction\ Cost_{jt} + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	TC1	TC2	TC3
Home bias	-0.931***	-0.935***	-0.942***
	(-59.25)	(-59.86)	(-60.98)
TC1	-2.836***	-0.602**	-0.631***
	(-14.59)	(-2.23)	(-7.42)
Overall R^2	0.471	0.304	0.311
Number of observations	3011	3011	3011

Table 6-4: Regression with all controls

In all regressions, the dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t *($w_{i,j,t}$).* The three key measures of *Transaction Costs* (in basis points and scaled by 100) include TC1 (commission) TC2 (fees) and TC3 (market impact).

The controls are bilateral home bias, stock market development/size, country economic development/policy risk(components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP), country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), investor protection, equity market openness, closely held firms, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, equity return correlation, three year moving average historical return and *Time Dummies*. Regressions are estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2^{'} . Transaction\ Cost_{jt} + \beta_3^{'} . Controls\ and\ Time\ dummies + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	TC1	TC2	TC3
Home bias	-0.927***	-0.925***	-0.929***
	(-96.70)	(-97.62)	(-97.30)
Transaction cost	-0.605***	-1.091***	-0.206**
	(-5.77)	(-5.65)	(-2.30)
Stock market development/size	0.551***	0.579***	0.583***
	(21.85)	(22.63)	(28.44)
Economic policy risk	0.560***	0.669***	0.484***
	(2.98)	(3.60)	(2.92)
Financial policy risk	0.682***	0.631***	0.561***
	(4.67)	(4.33)	(3.79)
Investor protection (WBGI)	0.900***	0.937	0.859***
	(11.14)	(1.25)	(12.38)
Equity market openness	1.585***	1.707***	1.650***
	(11.56)	(12.92)	(11.76)
Closely held firms	-3.999***	-4.087***	-4.145***
	(-16.74)	(-15.77)	(-16.96)
Common language	0.527***	0.546***	0.525***
	(6.37)	(5.80)	(5.98)
Bilateral trade	2.614***	2.481***	2.520***
	(14.24)	(13.27)	(13.58)

Distance	-0.143*** (-3.54)	-0.155*** (-3.51)	-0.156*** (-3.70)
Equity return correlation	-0.184 (-0.93)	-0.212 (-0.97)	-0.0416 (-0.21)
Historical return	0.341*** (11.12)	0.318*** (9.99)	0.327*** (11.13)
Year 1 dummy	-0.204*** (-12.64)	-0.218*** (-13.30)	-0.228*** (-13.62)
Year 2 dummy	-0.217*** (-14.60)	-0.201*** (-14.18)	-0.209*** (-14.13)
Year 3 dummy	-0.240*** (-14.82)	-0.215*** (-13.74)	-0.233*** (-14.03)
Year 4 dummy	-0.256*** (-13.53)	-0.236*** (-13.04)	-0.247*** (-13.05)
Year 5 dummy	-0.145*** (-11.78)	-0.217 (-10.14)	-0.229 (-12.12
Overall R^2	0.794	0.786	0.788
Number of observations	2917	2917	2917

Table 6-5: Regression output with different specifications

In all regressions, the dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t *($w_{i,j,t}$)*. The three key measures of *Transaction Costs* (in basis points and scaled by 100) include TC1 (commission) TC2 (fees) and TC3 (market impact).

The *Controls* are bilateral home bias (*HBIAS*), stock market development/size, country economic development/policy risk(components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP), country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), investor protection, equity market openness, closely held firms, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, equity return correlation, three year moving average historical return and *Time Dummies*. Different specifications and estimation methods used as noted below

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2' . Transaction\ Costs_{jt} + Controls + Time\ Dummies + \epsilon_{ijt}$$

Specification '*All in one – RE'* includes transaction cost, control variables, time dummies and uses random effect model.
Specification '*All in one – FE'* includes home bias, transaction costs, all time variant control variables, time dummies and uses fixed effect model.
Specification '*All in one – BE'* includes home bias, transaction costs, all time variant control variables, time dummies and uses between effect model.
Specification '*Free float home bias'* includes free float home bias, transaction cost, all control variables, time dummies and uses random effect model.
Specification '*One year lagged'* includes home bias, lagged transaction costs, all control variables, time dummies and uses random effect model.
Specification '*Major financial centres'* includes home bias, transaction costs, all control variables, time dummies and uses random effect model but the sample excludes USA, UK and Japan as investor countries to address the effect of major financial centres.

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	All in one - RE	All in one - FE	All in one - BE	Free float home bias	One year lagged	Major financial centres
Home bias	-0.927***	-0.928***	-0.947***	-0.827***	-0.954***	-0.933***
	(-95.52)	(-76.35)	(-28.57)	(-67.10)	(-91.91)	(-90.20)
TC1	-0.650***	-0.383***	-9.312***	-0.590***	-0.740***	-0.662***
	(-5.73)	(-2.77)	(-14.68)	(-4.21)	(-6.46)	(-5.19)
TC2	-1.108***	-1.083***	-1.007***	-1.092***	-0.906***	-1.101***
	(-5.18)	(-4.13)	(-2.81)	(-4.61)	(-4.37)	(-4.61)
TC3	-0.298***	-0.187***	-9.694***	-0.141**	-0.195**	-0.288***
	(-3.07)	(-2.95)	(-14.02)	(-2.23)	(-2.53)	(-2.65)

Stock market development/size	0.600*** (28.80)	0.601*** (25.00)	1.255*** (15.44)	0.569*** (21.56)	0.469*** (15.57)	0.593*** (25.41)
Economic development/policy	0.309* (1.83)	0.752*** (5.18)	10.51*** (7.57)	0.832*** (3.58)	0.732*** (2.67)	0.323* (1.71)
Financial policy Risk	0.670*** (4.42)	0.626*** (4.77)	0.852* (1.82)	0.410** (2.28)	0.766*** (4.69)	0.685*** (4.05)
Investor protection (WBGI)	0.809*** (11.46)	0.909 (1.58)	0.517 (0.84)	0.739 (1.25)	0.471*** (4.85)	0.812*** (10.24)
Equity market openness	1.705*** (12.61)	1.609*** (9.99)	0.629*** (2.51)	2.944*** (17.49)	2.661*** (17.56)	0.489*** (3.27)
Closely held firms	-3.878*** (-18.25)	NA	-1.297*** (-5.33)	-4.428*** (-15.76)	-4.141*** (-18.83)	-3.912*** (-16.52)
Common language	0.539*** (7.07)	NA	0.433*** (4.74)	0.355*** (3.20)	0.655*** (8.34)	0.511*** (6.17)
Bilateral trade	2.702*** (15.44)	1.956*** (8.06)	2.293*** (12.95)	1.885*** (12.67)	2.825*** (18.05)	2.572*** (12.22)
Distance	-0.142*** (-3.97)	NA	-0.218*** (-6.02)	-0.352*** (-7.38)	-0.140*** (-3.76)	-0.184*** (-4.43)
Equity return correlation	-0.254 (-1.48)	NA	-0.629*** (-3.08)	-0.725 (-1.20)	-0.242 (-1.27)	0.0583 (0.29)
Historical return	0.312 (1.21)	0.328*** (1.66)	0.114 (0.78)	0.367*** (8.96)	0.228*** (7.00)	0.316*** (9.24)
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Overall R^2	0.821	0.679	0.794	0.641	0.796	0.813
Number of observation	2917	2917	2917	2910	2392	2362

Chapter 7 Second empirical study: Country specific equity market characteristics and FEPA

Our second empirical study examines the role of country-specific equity market characteristics (CSEMC) on the country allocation decision of foreign investors. As mentioned earlier (chapter 3), despite strong theoretical reasoning consistent with international capital asset pricing model, described in chapter 2, there are relatively less number of studies demonstrating the significance of CSEMC on FEPA. The unavailability of good quality cross-country bilateral data has been the main hurdle limiting the number of investigations. With the availability of CPIS (IMF) data, it is now possible to undertake comprehensive examinations. In line with the arguments developed in chapter three (see section 3.2), we test the following hypotheses:

H_4 Stock market development/size has positive influence on FEPA.

H_5 Foreign investors prefer to overweight markets with higher liquidity.

H_6 Foreign investors prefer to underweight emerging markets.

H_7 Foreign investors prefer to underweight markets with higher equity market volatility.

H_8 Foreign investors prefer to underweight markets with higher real exchange rate volatility.

7.1 Summary statistics

Before examining the regression results, it is worth exploring the descriptive statistics (average over cross-section and time) providing valuable information on the expected relationship. Our key variables of interest are equity market development/size, turnover ratio, emerging market dummy, equity market volatility and exchange rate volatility. As seen in Table 7-1 (column 3), the top ten countries ranking against stock market development/size measure are all developed markets with the exception of Chile and Malaysia. Similarly, the bottom ten countries generally represent emerging markets with exception of Austria, New Zealand and Portugal. Furthermore, as seen in the same table, most of the countries that receive higher level of foreign equity

portfolio allocation are also developed markets. As such, going by this association, it indicates that foreign investors are motivated to hold higher equity portfolio investments in bigger and more developed equity market.

In addition, most of the countries with highest turnover ratio are also developed countries with the exception India, Taiwan and Korea as exhibited in Table 7-1 (column 4). As noted earlier, a market may show good performance in terms of overall index but may not translate into similar performance due to significant changes in price when portfolios are liquidated (Solnik and McLeavey, 2009). As seen from Table 7-1 (column 4) most of the emerging markets exhibit thinner trading activities relative to their developed counterparts suggesting foreign investors may be inclined to lower their portfolio allocation in the illiquid markets. In line with aforementioned argument, the regression coefficient is expected to bear positive sign.

In terms of volatility of equity market, Table 7-1 (column 5) documents the summary statistics. Except Belgium, all the top ten countries with higher volatility are emerging markets signifying greater potential risk. Investors may shy away from markets having higher market volatilities reflecting higher uncertainty. The regression coefficient on this variable should bear negative sign.

The ten markets with highest exchange rate volatility are generally all emerging countries with the exception of Australia and New Zealand. Turkey reveals the highest exchange rate volatility. Similarly, ten countries with lowest exchange rate volatility are all developed markets except for Malaysia and Thailand. Austria in our sample exhibits the lowest real exchange rate volatility with 1.9% of three-year moving average standard deviation for the sample period.

…….Insert Table 7-1 about here, see page 154……

7.2 Basic regression

Do foreign investors allocate more funds to more developed and relatively stable equity markets? Our univariate analysis does indicate so. We run a number of regressions addressing various issue to ensure our study is as robust as possible. We first estimate the following basic regression

model with each of the five variables, discussed above, individually in following regression. The results are reported in Table 7-2.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \beta_2 . Home\ bias + \epsilon_{ijt} \quad 7.1$$

As seen, all the CSEMC coefficients are highly statistically significant and carry expected sign. The most notable figures are the R^2 for *stock market development/size* and *emerging market dummy* regressions, which are 36% and 43% respectively. The emerging market dummy variable captures most of the market specific risk including market development and market efficiency as noted in our earlier discussion. This clearly shows that investors are inclined to invest in more developed markets. The significance of other variables suggests foreign investor are more leaned to allocate higher proportion of their wealth in markets which are larger in size, relatively more liquid and efficient, and with lower equity market and exchange rate volatility. As discussed earlier in our hypotheses development chapter, the results are consistent with existing studies (Harvey, 1995, a,b; Kawakatsu and Moorey, 1990; Fama and French, 1998; Rouwenhorst, 1999; Gelos and Wei, 2005 and Chan et al. 2005).

…….Insert Table 7-2 about here, see page 155……

As multi-collinearity is not a major problem (see Table 7-3) for our country specific equity market characteristic ($CSEMC_{jt}$) factors, we include all the five variables in the following specifications.

…….Insert Table 7-3 about here, see page 156……

7.3 All in one and without home bias

We next run the random effect model including all our five CSEMC variables in a single regression but without any controls. The results are reported in Table 7-4 (column 2).

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \epsilon_{ijt} \quad 7.2$$

We find that all the $CSEMC$ variables are highly significant at 1% significance level except for the exchange rate volatility, which is statistically significant at 10% level. The overall R^2 of the above specification shows that $CSEMC$ accounts almost 45% of cross sectional and temporal variation in FEPA, again suggesting that level of equity market development and efficiency are most influential factors contributing to foreign investors' country allocation decision. The significance of stock market development/size is in line with previous studies validating the claim that investors prefer to over-weight bigger and more developed markets. Similarly, the statistical significance of emerging market dummy again is an indication that foreign investors not only prefer bigger but also markets with higher liquidity and efficiency in terms of information dissemination and the pace at which adjustment of the price takes place. As noted above, it is well known that emerging markets not only lack depth and breadth but also are relatively inefficient. As such, despite theoretical prescription, investors tend to invest less in emerging markets.

The micro-structural variable, *liquidity*, also supports our claim of investor preferring efficient and liquid market. Better market liquidity also seems to have positive impact suggesting foreign investor are more leaned to invest in markets having liquid assets and underweight illiquid markets. The findings are consistent with our analysis of summary statistics supporting the evidence that most of the relatively more liquid markets are also the major recipients of foreign equity portfolio investments. As we noted earlier, most of emerging markets are relatively illiquid (Bekaert and Harvey, 2003 and Solnik and Mcleavey, 2009) and hence, the significance of *liquidity* factor is in line with the predicted theory.

Similarly, e*quity market volatility* is also highly significant with expected negative sign following our theoretical framework of Cooper and Kaplanis (1986). The statistical significance provides strong indication that investors tend to avoid relatively more volatile markets.

The *exchange rate volatility,* capturing the portion of volatility arising from movement in foreign exchange rate, is significant at 10% level. The expected sign provides strong indication that foreign investors seek currency risk premium with respect to uncertainty observed in exchange rate movement. The significance is an indication that PPP theory does not hold, at least in the

short run, suggesting foreign investors are exposed to real exchange rate risk (see Alder and Dumas, 1983; Dumas and Solnik, 1995; Solnik, 1974 and Zimmerman et. al., 2003).

As noted earlier, although most of our variables are statistically significant, they may be biased and inefficient in the absence of other control variables. In order to ensure our study is robust in the presence of controls and alternative estimations, we run different regressions challenging the robustness of our estimates.

…….Insert Table 7-4 about here, see page 157……

7.4 Regression only with home bias

We next run the following specification including the home bias only as the control and all the CSEMC variables. The findings are reported in Table 7-4 (column 3)

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \beta_2 . Home\ bias + \epsilon_{ijt} \quad 7.3$$

As expected, addition of home bias measure has significantly improved adequacy of the model. As reported in our previous empirical chapter, the home is highly significant and alone explains 18% (63-45) of the variation in FEPA. This shows that strong home bias still exists in the international equity allocation. All our CSEMC are still statistically significant. The changes in size of the estimates are expected with specification 7.3 suffering less from omitted variable bias compared to previous specifications.

7.5 Observed controls and omitted variable bias

All estimates in the above specifications may still be biased in the absence of other factors correlated with CSEMCs. Similarly, because we have used 36 countries with six years of time dimension, there could be significant country specific and time effect rendering our specification inadequate. Accordingly, we first run the following specification including CSEMC, home bias, all observable controls and time dummies. The results are presented in Table 7-4 (column 4).

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \beta_2 . Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \quad 7.4$$

Notably, the R^2 significantly increases to 84% implying the controls and time dummies have additional explanatory power of almost 21% (84-63). The significance of home bias measure again corroborates the claim that investors still prefer their home markets relative to mean variance prescription. All coefficients on CSEMC are still statistically significant, even at 1% significance level, and bear expected sign. The size of coefficients changes, which is understandable as the addition the control variables mitigates bias to a significant extent.

7.6 Unit specific effect

The main purpose of employing panel data framework is to allow for unit specific effect, which if correlated with any of the regressors, may potentially render our estimates bias. Although we have been able to control most of the time varying and time invariant variables, there could still be unit specific effect driving the allocation[18]. Examples of such effect could be special treaty between pair countries, favourite country, cultural ties, and common colonial history. We address the issue of unobserved individual heterogeneity by running the following specification and estimate our model with fixed effect estimation method discussed in methodology chapter.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \beta_2 . Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \qquad 7.5$$

As shown in Table 7-4 (column 5) all our CSEMC variables are still statistically significant at 5% significance level. This confirms that after including observed and unobserved controls, all the CSEMC measures have significant influence on foreign equity investors' country allocation decision.

7.7 Between effect estimation

Here we only use the information on the individual differences between the entire cross sectional units and totally neglect the time series dimensions. Although this estimation method is not as efficient as the random effect procedure, for the purpose of further robustness, we estimate following specification using the between effect model.

[18] The Hausman test, Chi-square = 117, confirms that the fixed effect model is statistically preferred model. Similarly, the Breusch-pagan test statistic, Chi-square = 342, also confirms the presence of unit specific effect.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt-1} + \beta_2 . Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \quad 7.6$$

As shown in Table 7-4 (column 6), all our CSEMC variables are statistically significant as the conventional 5% level. This shows that we are able to test our hypotheses even by using the between variation information in our panel data model. However, as expected the size of the coefficients do changes with the use of *between variation* information only compared to *between and within* in the random effect model.

7.8 Reverse causality bias

Our estimates may still be biased, with respect to reverse causality problem. It is well known in the literature (see Errunza, 2001) that the increase in international investment also has positive impact on the development of local capital markets, an issue extensively discussed in chapter 1. If this is to be true, it is likely that our estimates suffer from endogeneity problem arising from reverse causality. We address this using one-year lag value for all our CSEMC variables and run the following specification.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt-1} + \beta_2 . Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \quad 7.7$$

As reported in Table 7-5 (column 2), all our estimates are still highly statistically significant, even at 1% level of significance. However, it is worth noting that the size of these estimates represent lag effect rather than the level and therefore are not comparable to previous specifications.

…….Insert Table 7-5 about here, see page 160……

7.9 Free float home bias

As noted earlier our *home bias* measure is constructed under the assumptions that entire market value is freely available to foreign investors. This may not be true, particularly for emerging markets. In order to address this issue we included the *equity market openness* measure correcting for the issue of *free float*. We construct *freely floated home bias* measure using the

S&P/IFC's freely investable market value as the benchmark weight instead of the standard global market value. Again, a caveat is worth noting here. This measure is only available for the emerging markets. We assume that for developed markets, the entire market value is freely available to foreign investors, which may not be true. However, we believe the inclusion of *closely held firms* captures the deficiency, if any. We run the following specification using freely floated (*Fl_Home bias*). The estimation outputs are reported in Table 7-5 (column 3).

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt} + \beta_2 . Fl\_Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \quad 7.8$$

The results for the float-adjusted home bias, while less pronounced, are qualitatively the same as those for the unadjusted home bias. All our variables of interest, i.e., CSEMC remain highly significant.

7.10 Major financial centres

We next address the issue of major financial centres. As noted in our previous chapter, our dataset on international equity portfolio investments includes direct purchase in the domestic markets, global shares and depository receipts. Solnik and McLeavey (2004) note that big and internationally active companies issue/cross-list their stocks on multiple and major stock exchanges (such as London, New York and Tokyo). These listings are motivated to acquire wider investor base, greater visibility, higher liquidity and to avoid stringent and costly home regulatory stipulations. If this case, CSEMC measures may not matter to international investors as they can have exposure to the foreign stocks in their own major financial centres. We address this issue by running the following specification that exclude USA, UK and Japan as the investor countries.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{jt-1} + \beta_2 . Home\ bias + \beta_3 . Controls\ and\ time\ dummies + \epsilon_{ijt} \quad 7.9$$

As shown in Table 7-5 (column 4), even after removing the investors from the major financial centres, the coefficient of all our CSEMC factors are still highly significant implying stock market development/size, market liquidity/efficiency and market stability significantly influence foreign investors' decision of country allocation.

7.11 Control variables

As in the previous chapter, after the addition of CSEMC variables, most of the controls have expected sign and their statistical significance are robust across different specifications except for the equity market correlation, historical return and investor protection measures. The inconsistency of correlation and historical return are similar to that reported in our first empirical study. The investor protection measure, as indicated in our hypotheses development chapter, is a contentious issue and we pay comprehensive attention in the following empirical chapter.

7.12 Chapter summary

Empirical research on foreign equity portfolio investments has been limited by unavailability of cross border equity portfolio investment data. We use the recently available cross-country equity portfolio holdings data for 36 countries, sourced from IMF and several proxies capturing different features of CSEMC. Employing various panel data models, we show that stock market development/size, liquidity, stock market and exchange rate volatility are important factors explaining the temporal and cross-section variation in foreign equity portfolio allocation. The implications are that policy makers, particularly in emerging markets, must endorse reforms aimed at developing their local equity market for attracting foreign equity portfolio investors.

Table 7-1: Summary statistics (average over cross-section and time) of key variables

Country	Portfolio Allocation	Equity market dev./size (% of GDP)	Turnover Ratio (% of MCap)	STD of Equity Returns (%)	Exchange Rate Volatility (%)
Argentina	0.0005	51.20	10.38	50.57	15.98
Australia	0.0146	110.39	76.70	17.08	7.20
Austria	0.0045	30.05	76.68	25.85	1.91
Belgium	0.0108	72.08	25.13	33.36	2.36
Brazil	0.0054	45.14	35.50	52.10	15.50
Canada	0.0171	110.50	66.45	21.10	5.08
Chile	0.0004	104.53	11.71	24.64	7.36
China	0.0041	45.67	88.30	32.68	6.36
Czech Republic	0.0009	24.54	67.52	34.21	5.02
Denmark	0.0056	61.87	75.23	27.83	2.32
Finland	0.0210	115.00	116.28	26.81	2.89
France	0.1081	82.55	83.83	21.30	2.46
Germany	0.0882	46.52	131.00	26.77	3.38
Greece	0.0028	51.91	40.10	20.66	4.01
Hungary	0.0020	25.54	63.22	22.69	5.26
India	0.0031	51.35	133.67	31.27	4.41
Indonesia	0.0101	24.65	43.82	31.28	13.14
Italy	0.0343	45.63	120.27	23.14	2.68
Japan	0.0794	78.59	97.17	20.19	6.66
Korea	0.0107	65.31	249.15	18.24	5.24
Malaysia	0.0015	144.92	27.87	12.66	3.32
Mexico	0.0042	25.47	26.49	23.47	6.51
NZL	0.0015	39.56	41.80	18.47	6.88
Norway	0.0057	53.11	102.80	28.11	5.05
Peru	0.0002	34.37	7.50	27.29	3.79
Philippines	0.0004	45.19	12.96	25.91	5.51
Poland	0.0017	24.68	31.84	42.50	7.76
Portugal	0.0027	40.10	50.73	17.63	2.04
Russia	0.0058	55.82	45.98	21.36	13.19
Sweden	0.0209	107.61	117.16	33.76	4.17
Switzerland	0.0533	246.67	93.00	15.95	3.50
Taiwan	0.0058	76.05	182.28	14.51	4.36
Thailand	0.0018	60.42	101.51	32.18	3.76
Turkey	0.0019	32.82	44.96	49.18	16.77
UK	0.1573	138.75	112.83	16.85	3.90
USA	0.3776	133.22	160.50	20.49	3.76

Table 7-2: Base Model Regressions

The dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t ($w_{i,j,t}$). The independent variables are home bias (HBIAS), the five measures of country specific equity market variables (*CSEMC*), which includes stock market development/size, emerging market dummy, market liquidity, equity market volatility and exchange rate volatility. Regressions are estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2^{'} . CSEMC_{it} + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	Stock market development/size	Emerging market dummy	Liquidity	Equity market volatility	Exchange rate volatility
Home bias	-0.923*** (-68.96)	-0.890*** (-52.53)	-0.885*** (-50.23)	-0.888*** (-52.29)	-0.919*** (-65.27)
Stock market development/size	0.911*** (42.87)				
Emerging market dummy		-2.894*** (-21.88)			
Liquidity			10.03*** (4.73)		
Equity market volatility				-0.156*** (-4.49)	
Exchange rate volatility					-7.026*** (-23.00)
Overall R^2	0.356	0.426	0.172	0.132	0.197
Number of observations	3196	3196	3196	3196	3196

Table 7-3: Correlation between country specific equity market characteristics/risk

	Stock market development/size	Emerging market dummy	Market Liquidity	Equity market volatility	Exchange rate volatility
Stock market development/size	1.00				
Emerging market dummy	-0.40	1.00			
Liquidity	0.26	-0.19	1.00		
Equity market volatility	-0.15	0.16	-0.12	1.00	
Exchange rate volatility	-0.30	0.45	-0.29	0.29	1.00

Table 7-4: Regression with different specification and estimation methods

In all regressions, the dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t ($w_{i,j,t}$). The independent variables includes the key five measures of country specific equity market variables (*CSEMC*), which includes stock market development/size, emerging market dummy, market liquidity, equity market volatility and exchange rate volatility. Regressions are estimated using random effect model. The controls include home bias, transaction cost, economic policy risk, financial policy risk, investor protection, equity market openness, closely held ownership, common language dummy, bilateral trade, distance between capital cities of the pair country, equity return correlation, historical return and time dummies.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{it} + \beta_2 . Controls + \epsilon_{ijt}$$

Specification 'CSEMC' only includes the CSEMC variables. Regression is estimated using random effect model.
Specification 'With home Bias' includes CSEMC variables and the home bias measure. Regression is estimated using random effect model.
Specification 'All control-RE' includes CSEMC variables, home bias measure and all other controls including time dummies. Regression is estimated using random effect model.
Specification 'All control-FE' includes CSEMC variables, home bias measure and all other controls including time dummies. Regression is estimated using fixed effect model.
Specification 'All control-BE' includes CSEMC variables, home bias measure and all other controls including time dummies. Regression is estimated using the between effect model.

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	CSEMC	With home bias	All control - RE	All control - FE	All control - BE
Stock market development/size	0.791***	0.838***	0.656***	0.648***	1.180***
	(17.90)	(39.76)	(29.73)	(30.98)	(16.75)
Emerging market dummy	-2.065***	-2.222***	-1.206***	NA	-0.685***
	(-15.99)	(-22.62)	(-11.47)		(-4.37)
Liquidity	3.75***	11.17***	9.213***	2.836**	14.8***
	(8.13)	(6.21)	(5.09)	(1.94)	(13.95)
Equity market volatility	-0.191***	-0.171***	-0.168***	-0.153***	-1.004**
	(-3.74)	(-9.06)	(-6.67)	(-5.46)	(-2.11)
Exchange rate volatility	-1.475*	-3.757***	-1.505***	-1.598***	-4.623***
	(-1.83)	(-11.42)	(-5.34)	(-7.02)	(-3.32)

Home bias	-0.938*** (-90.17)	-0.933*** (-99.80)	-0.935*** (-82.87)	-0.887*** (-32.57)
Transaction cost		-0.502*** (-6.82)	-0.283*** (-5.14)	-7.120*** (-13.60)
Economic policy risk		0.141* (1.82)	0.508** (2.54)	6.774*** (4.84)
Financial policy risk		0.641*** (3.67)	0.423*** (3.20)	4.538*** (5.16)
Investor protection (WBGI)		0.230*** (3.00)	0.632*** (8.04)	1.358 (1.16)
Equity market openness		1.618*** (10.54)	1.344*** (6.24)	1.609*** (4.17)
Closely held firm		-2.899*** (-17.50)	NA	-0.255** (-2.13)
Common language		0.376*** (5.58)	NA	0.389*** (5.12)
Bilateral trade		2.712*** (16.66)	1.836*** (7.59)	1.894*** (12.63)
Distance		-0.131*** (-4.07)	NA	-0.175*** (-5.31)
Correlation		-0.852*** (-4.37)	NA	0.422 (1.05)

Historical return			0.317***	0.338***	-0.90
			(8.76)	(12.96)	(-1.24)
Time fixed effects			Yes	Yes	Yes
Overall R^2	0.449	0.630	0.841	0.861	0.812
Number of observations	3290	3196	2917	2917	2917

Table 7-5: Regression addressing different issues

In all regressions, the dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t ($w_{i,j,t}$). The independent variables includes the key five measures of country specific equity market variables (*CSEMC*), which includes stock market development/size, emerging market dummy, market liquidity, equity market volatility and exchange rate volatility. Regressions are estimated using random effect model. The controls include home bias, transaction cost, economic policy risk, financial policy risk, investor protection, equity market openness, closely held ownership, common language dummy, bilateral trade, distance between capital cities of the pair country, equity return correlation, historical return and time dummies. All regressions estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . CSEMC_{it} + \beta_2 . Controls + \epsilon_{ijt}$$

Specification 'Lagged' includes CSEMC lagged by one year, home bias measures and all controls including time dummies.
Specification 'Free float home bias' includes CSEMC, home bias based on free float market capitalization and all controls including time dummies.
Specification 'Major financial centres' includes CSEMC, home bias, all controls including time dummies but excludes major investor countries (USA, UK and Japan).

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	Lagged	Free float home Bias	Major financial centres
Stock market development/size	0.289***	0.631***	0.648***
	(7.80)	(22.64)	(26.42)
Emerging market dummy	-1.567***	-1.230***	-1.268***
	(-16.66)	(-8.85)	(-10.59)
Liquidity	12.85***	7.976***	8.957***
	(6.77)	(3.28)	(4.50)
Equity market volatility	-0.210***	-0.189***	-0.168***
	(-5.02)	(-6.83)	(-5.98)
Exchange rate volatility	-0.808***	-0.914***	-1.494***
	(-3.37)	(-2.96)	(-4.73)
Home Bias	-0.950***	-0.825***	-0.941***
	(-83.16)	(-67.62)	(-94.70)
Transaction cost	-0.323	-0.361***	-0.491***
	(-0.37)	(-4.04)	(-5.99)
Economic policy risk	0.730***	0.512*	0.131*
	(2.77)	(1.94)	(1.90)

Country financial risk	1.412***	0.435**	0.654***
	(6.87)	(2.18)	(3.43)
Investor protection (WBGI)	-0.139	0.230	0.247***
	(-1.53)	(1.18)	(2.91)
Equity market openness	2.630***	2.938***	1.611***
	(17.11)	(15.99)	(9.31)
Closely held firm	-3.308***	-3.428***	-2.909***
	(-20.41)	(-13.94)	(-15.64)
Common language	0.435***	0.138	0.419***
	(6.02)	(1.37)	(5.75)
Bilateral trade	3.085***	1.672***	2.353***
	(21.66)	(11.92)	(11.44)
Distance	-0.128***	-0.388***	-0.154***
	(-4.25)	(-8.64)	(-3.99)
Equity return correlation	-0.982***	-1.391***	-0.981***
	(-5.20)	(-5.49)	(-4.30)
Historical returns	0.397***	0.406***	0.323
	(10.56)	(8.73)	(1.03)
Time Fixed Effect	Yes	Yes	Yes
Overall R^2	0.845	0.689	0.852
Number of observations	2392	2910	2362

Chapter 8 Third empirical study: Investor protection and FEPA

We have used a composite measure of investor protection measure obtained from *World Bank Governance Indicator* to control for the level of investor protection in the various specifications estimated in our previous two empirical studies. The results have been inconsistent across different specifications. In this chapter, we specifically focus on the concern of investor protection taking a more robust approach and use relatively more reliable, forward-looking and extensively used investor protection measures of ICRG (see Bekaert et. al., 2007 and Bekaert and Hodrick, 2009). Most of the investor protection proxies used in the literature (see LLSV, 1997, 1998, 2000) lacks time dimension. Therefore, given the panel set-up of our dataset, we resort to using the time varying investor protection measures maintained and reported by ICRG.

As noted earlier, the results on the role of investor protection on foreign portfolio allocation are mixed. Agarwal et al., (2005) using U.S. data find that U.S. investors are inclined to allocate more funds to countries with better investor protection rights in place. However, Chan et al., (2005) using data on 26 countries (emerging and developed) show that investors are influenced more by stock market development and bilateral familiarity issues and investor protection does not play any significant role. In fact, their study finds that the investor protection measures carry unexpected sign. In addition and as discussed earlier, studies have also added novel dimension to the investor protection issues when it comes to foreign portfolio investment. Bekaert et al., (2007) construct a novel measure of exogenous growth opportunity based on a country's industry PE ratio and global PE ratio for over 50 countries. They demonstrate that the general investor protection measure, which they refer to as *quality of institution*, maintained by ICRG, does not seem to better align with growth opportunities. However, when using measures of *investment profile*, a measure also maintained by *ICRG* and one that specifically reflects government's attitude towards foreign investments capturing risk of expropriation/contract viability, payment delays and the ability to repatriate profits, they find significant relationship with growth opportunities. The overall measure of ICRG's *political risk* index measure is also highly significant, which include *quality of institutions* and *investment profile* are part of overall political risk measure. Based on their findings they claim that the overall positive influence of political risk rating is not due to broader *quality of institution* but due to *investment profile*. They

conjecture that foreign investors may therefore only care about investor protection issues that directly affect them, i.e. *investment profile*. However, they do not empirically test this economic claim. With the objective of assessing this indirect claim of Bekaert et al., (2007) our study uses the ICRG's *investment profile* measure as one of the variables to study the role of investor protection influencing the decision of foreign portfolio equity investment.

Following the discussion above, we tests following thee hypotheses:

H_9 Higher levels of investor protection measures specifically related to foreign investment are associated with higher levels of FEPA.

The first hypothesis tests whether foreign investors are influenced by investor protection measures specific to foreign investments or not? We use ICRG's *investment profile* as measure of investor protection measure directly related to foreign investments.

H_{10} Higher levels of general investor protection measures are associated with higher levels of FEPA.

The second hypothesis tests whether foreign investors take account of the general investor protection measure when considering foreign investments or not? We use the *quality of institution* measure as constructed by ICRG as proxy of general investor protection measure applicable to all investors.

H_{11} Countries adopting English common law attracts higher levels of FEPA.

As noted earlier, following LLSV (1997, 1998) and Chan et al., (2005), we use the dummy taking the value of one if countries follow English common law and zero otherwise. We now discuss the empirical findings of our various tests.

8.1 Descriptive statistics

We first explore descriptive statistics shown in Table 8-1. The second column shows average foreign portfolio allocation received by different countries over the period of six years (2001-2006). Third and fourth columns report average rating of each country in terms of investor protection indicators, IPI (i.e. investment profile) and IPII (quality of institution). The fifth column presents the composite rating of IPI and IPII and the final column shows the dummy for the legal system (English common law or otherwise) followed by countries. Those following English common law are assigned value of one and zero otherwise. All the countries are ranked against composite investor protection index (IPI+IPII).

The result shows that the top fifteen are developed countries and receive almost 86% of the total foreign portfolio investments. The bottom fifteen countries are developing countries, with possible exception of Greece, and share approximately 5% of the total portfolio allocation. Notably, countries that use the English common law receive approximately 58% of the total portfolio investments.

……Insert Table 8-1about here, see page 170…….

The descriptive statistics shows that countries receiving higher allocation also ranking higher against the composite investor protection index (IPI+IPII). The figures provide an early indication of a positive relationship between better investor protection and higher foreign equity portfolio allocations.

8.2 Regression results

For our regressions, we use the data set for 36 countries (host countries) with bilateral equity allocation from investors of 16 developed counties (source countries) for the period of six years (2001-2006). We use panel data framework and employ random effect model in most of our regressions along with *between* and *fixed effect* models in two specifications discussed below. Since our aim is to examine whether investor protection climate has any significant impact on international portfolio allocations, we run the following base model that only controls for home bias:

$$w_{ijt} = \alpha + \beta_1 . HBIAS_{ijt} + \beta_2 . Investor\ protection_{jt} + \epsilon_{ijt} \quad \text{8-1}$$

The coefficient for investor protection variable is expected to be positive since international investors prefer countries with better investor protection rights. The regression results are presented in Table 8-2. As expected, the coefficients for investor protection measures are positive and statistically significant at 5% level. The coefficient of home bias is also highly significant confirming the widely reported phenomenon of home bias exhibited by foreign investors in their portfolio allocation decisions. The results suggest that after controlling for home bias, different levels of investor protection measures significantly influence foreign portfolio investments. However, the results may not be entirely reliable and robust in the absence of other confounding variables. In the following sections we run number of regressions using different specifications and address different issues to ensure that our findings are robust.

……Insert Table 8-2 about here, see page 171…….

8.3 Omitted variables bias

The first issue we deal relates to omitted variable bias. Our regression coefficients estimated in specification 8-1 may be biased in the absence of the various control variables. In the following regression, we include control variables and time dummies.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2^{'} . Investor\ protection_{jt} + \beta_3^{'} . Contols + \epsilon_{ijt} \quad \text{8-2}$$

The results, reported in Table 8-3, show that size of the investor protection coefficients is lower than estimated via specification 8-1. The inclusion of the control variable and time dummies seem to account for the possible omitted variable bias. However, coefficient for IPII becomes insignificant with coefficients of IPI and IPIII still being highly statistically significant. These results seem to indicate that investors may only be concerned with those aspects of investor regulations that are most favourable to foreign investors. Furthermore, even the countries following English common law are the ones receiving the highest portfolio allocation. However, to assess the robustness of this result we undertake different sensitivity analysis. Before discussing the sensitivity tests, it is worth noting that we have not included both IPI and IPII in

single regression because of the high collinearity (correlation coefficient of 0.71) between the IPI and IPII.

……Table 8-3 about here, see page 172…….

8.4 Unit specific effect and between effect estimation

As discussed earlier, the main purpose of using the panel data set-up is to control for the correlation of the individual effect with any of the regressors, which if not taken account for, may render the estimates biased. We use the fixed effect model to control for any unit specific effect as discussed earlier[19]. As shown in Table 8-4 coefficients for IPI and IPIII are still significant at the conventional level of 5%. IPII is not only statistically insignificant but also carries opposite sign. For interpreting the coefficients for practical or economic significance, we would prefer the coefficients of fixed effect model given its ability to account for unit specific effect or individual heterogeneity.

……Insert Table 8-4 about here, see page 174…….

Next we use the *between effect* model that ignores the time series dimensions and only uses the cross-sectional information to estimate the parameters. The results are shown in Table 8-5. The statistical significance of IPI and IPIII are maintained and now IPII is significant at the 5% level. However, it would not be appropriate to draw any firm conclusion because the *between effect* model is not only highly inefficient but also runs the risk of being biased due to its inability to control for the unit specific effects. When we use more efficient random effect and more robust fixed effect model, IPII becomes insignificant.

……Insert Table 8-5 about here, see page 176…….

[19] The result of Hausman tests (Chi-square of 53 for IPI and 133 for IPII using specification 8.2) and Breush-Pagan test (Chi-square of 222 and 376 for IPI and IPII respectively using specification 8.2) justifies the estimation using fixed effect model.

8.5 Reverse causality

As noted in our earlier empirical chapters, endogeneity arising from reverse causality could be a potential problem in our estimations. We tackle it by using one year lagged value of investor protection measure[20] and estimate the following specification.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt-1} + \beta_3^{'} Contols + \epsilon_{ijt} \quad \text{8-3}$$

The results shown in Table 8-6 suggest that while the coefficient for IPI is positive and statistically significant, coefficient for IPII is not statistically significant. This may suggest, as noted earlier, that foreign investors may be more concerned with investor protection measures that directly affect their investment value and returns captured by the IPI measure. The finding is also consistent with Bekaert et al., (2007)'s conjecture who note that foreign investors are more concerned about those aspects of legal and regulatory environment directly related to foreign investments (IPI - capturing potential risk of expropriation, payment delays and the ability to repatriate profits) rather than the general quality of institution variable (IPII).

…….Insert Table 8-6 about here, see page 178…….

8.6 Free float home bias

We address issue of free float by computing our home bias measure using the IFC/S&P investable market value. Results shown in Table 8-7 are consistent with all the specifications used earlier, with IPI and IPIII being highly significant but IPII is not significant.

The results indicate that our composite measure of investor protection sourced from World Bank Governance Indicator used in previous chapters were either capturing the effect of other variables or they were not able to isolate the effects of investor protection specific to foreign investments (i.e. investment profile) and general investor protection environment (quality of institutions).

…….Insert Table 8-7 about here, see page 180…….

[20] The use of the lag value of the indices also addresses the possibility of the investors acting on the basis of expected investor protection measures. We do not include the IPIII as it is a time invariant dummy variable.

8.7 Major financial centres

We next consider the possibility that international investors may choose to buy foreign stocks and/or depository receipts listed in major financial centres instead of directly investing in shares traded in the foreign equity markets. International investors may be tempted to use major financial centres, such as USA, UK and Japan, to buy the cross listed stocks and/or depository receipts because they may perceive that their rights are better protected by regulations in major financial centres (Reese and Weisbach, 2002). In order to accommodate this possibility, we exclude USA, UK and Japan from our sample and run the following specification:

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2^{'} . Investor\ protection_{jt} + \beta_3^{'} . Contols + \epsilon_{ijt} \quad \text{8-4}$$

Results reported in Table 8-8 show that despite excluding major financial centres, IPI and IPIII investor protection measures remain positive and statistically significant thus confirming that investor protection, particularly specific to foreign investments, remain an overwhelmingly top consideration for foreign investors. It also confirms that countries adopting English common law, which are better at establishing and enforcing investor protection measures (LLSV 1997, 1998, 2000), are able to attract higher level of foreign equity portfolio investments.

……Insert Table 8-8 about here, see page 182…….

8.8 Other control variables

Most of the control variables included in our estimations carry the expected sign and are significant except for historical returns, which are either not significant or change sign in different specifications.

8.9 Chapter summary

The conclusion whether investor protection framework play any role in country level equity portfolio allocation decision is controversial. Using bilateral cross-country foreign equity portfolio holdings data on 36 countries we demonstrate that investor protection is an important

input in country allocation decision. However, foreign investors appear to only follow investor protection index (investment profile) reflecting regulatory frameworks specific to foreign investment and may not worry about the general legal and regulatory infrastructure (quality of institutions). We also confirm that countries following English common law seem to attract higher level of foreign equity investments.

Table 8-1: Descriptive statistics (average over cross-section and time) of IP measures

Country	Portfolio Allocation (%)	IPI (0-12)	IPII (0-16)	Composite (IPI + IPII)	Common English Law (IPIII)
Finland	2.10	12.00	16.00	28.00	0
Sweden	2.09	12.00	15.25	27.25	0
New Zealand	0.15	11.83	15.33	27.17	1
Denmark	0.56	11.61	15.50	27.11	0
Austria	0.45	12.00	15.00	27.00	0
Canada	1.71	12.00	14.68	26.68	1
Norway	0.57	11.58	15.00	26.58	0
UK	15.73	12.00	14.17	26.17	1
Australia	1.46	11.33	14.50	25.83	1
Germany	8.82	12.00	13.50	25.50	0
Switzerland	5.33	11.75	13.50	25.25	0
USA	37.76	11.67	13.58	25.25	1
Belgium	1.08	11.61	12.92	24.54	0
Japan	7.94	11.67	12.50	24.17	0
Portugal	0.27	11.91	11.67	23.58	0
France	10.81	12.00	11.00	23.00	0
Chile	0.04	11.07	11.67	22.74	0
Hungary	0.20	11.74	10.59	22.33	0
Czech Republic	0.09	11.63	10.59	22.22	0
Taiwan	0.58	11.53	10.41	21.94	0
Italy	3.43	11.92	9.00	20.92	0
Poland	0.17	11.07	9.34	20.41	0
Greece	0.28	10.67	9.08	19.75	0
Mexico	0.42	11.17	7.49	18.66	0
Malaysia	0.15	8.75	8.92	17.67	1
India	0.31	8.57	8.99	17.56	1
Turkey	0.19	7.84	8.66	16.50	0
Philippines	0.04	9.42	6.99	16.42	0
Korea	1.07	9.65	6.00	15.65	0
Thailand	0.18	8.59	7.03	15.62	1
Peru	0.02	8.00	7.33	15.33	0
China	0.41	7.29	7.99	15.28	0
Russia	0.58	8.83	6.40	15.23	0
Brazil	0.54	7.75	6.67	14.42	0
Argentina	0.05	6.05	7.98	14.03	0
Indonesia	1.01	6.51	5.75	12.26	0

Table 8-2: Base Regression

The dependent variable is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time t ($w_{i,j,t}$). The key independent variables of interest are investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The only control is bilateral home bias (Hbias). Regression is estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error allowing for clustering within the cross sectional units). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%

	IPI	IPII	IPIII
Home bias	-0.913***	-0.889***	-0.889***
	(-56.99)	(-57.88)	(-51.87)
Investor protection	21.41***	22.48***	1.036***
	(17.73)	(18.33)	(4.99)
Overall R^2	0.264	0.308	0.161
Number of observations	3196	3196	3196

Table 8-3: Regression with investor protection and all controls

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control. Regressions estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + Contols + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

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	IPI	IPII	IPIII
Home bias	-0.931***	-0.932***	-0.932***
	(-99.75)	(-98.36)	(-98.55)
Investor protection	2.097***	-0.622	0.267***
	(2.70)	(-0.74)	(3.60)
Stock market development/size	0.672***	0.672***	0.665***
	(30.34)	(30.06)	(29.85)
Emerging market dummy	-1.357***	-1.369***	-1.308***
	(-13.98)	(-14.31)	(-13.86)
Liquidity	9.190***	9.709***	9.388***
	(4.97)	(5.32)	(5.23)
Equity market volatility	-0.173***	-0.175***	-0.172***
	(-6.69)	(-6.90)	(-6.82)
Exchange rate volatility	-1.818***	-1.760***	-1.733***
	(-5.50)	(-6.55)	(-6.25)
Transaction cost	-0.547***	-0.551***	-0.536***
	(-6.99)	(-6.89)	(-6.87)
Economic policy risk	0.117**	0.135**	0.125**
	(2.11)	(2.18)	(2.15)

Financial policy risk	0.651***	0.653***	0.664***
	(3.85)	(3.82)	(3.86)
Equity market openness	1.625***	1.649***	1.664***
	(10.55)	(10.19)	(10.80)
Closely held firms	-3.005***	-2.989***	-2.917***
	(-17.35)	(-17.78)	(-16.92)
Common language	0.454***	0.454***	0.381***
	(6.53)	(6.64)	(5.46)
Bilateral trade	2.650***	2.684***	2.633***
	(15.74)	(16.29)	(15.66)
Distance	-0.112***	-0.108***	-0.146***
	(-3.60)	(-3.60)	(-4.37)
Equity return correlation	-0.846***	-0.843***	-0.788***
	(-4.04)	(-4.11)	(-3.76)
Historical return	0.305	-0.305**	0.307***
	(1.28)	(-2.13)	(3.57)
Time fixed effect	Yes	Yes	Yes
Overall R^2	0.843	0.845	0.845
Number of observations	2917	2917	2917

Table 8-4: Regression with investor protection, all controls and uses fixed effect model

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are one year lagged value of *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control. Regressions are estimated using fixed effect model.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + Contols + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	IPI	IPII
Home bias	-0.932***	-0.931***
	(-81.34)	(-78.84)
Investor protection	2.725***	-0.357
	(3.70)	(-0.13)
Stock market development/size	0.671***	0.674***
	(30.48)	(31.15)
Liquidity	4.052*	5.111**
	(1.84)	(2.46)
Equity market volatility	-0.162***	-0.166***
	(-5.55)	(-5.71)
Exchange rate volatility	-2.143***	-1.894***
	(-7.50)	(-8.41)
Transaction cost	-0.428***	-0.385***
	(-6.04)	(-5.66)
Economic policy risk	0.330*	0.265**
	(1.76)	(2.31)
Country financial risk	0.541***	0.680***
	(3.91)	(4.86)
Equity market openness	1.475***	1.313***
	(7.02)	(5.92)

Bilateral trade	1.795***	1.794***
	(7.08)	(7.11)
Historical returns	0.309***	0.321
	(11.52)	(1.18)
With R^2	0.815	0.816
Number of observations	2917	2917

Table 8-5: Regression with investor protection, all controls and uses between effect model

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are one year lagged value of *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control. Regressions are estimated using fixed effect model.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + Contols + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	IPI	IPII	IPIII
Home bias	-0.907***	-0.887***	-0.939***
	(-31.22)	(-32.18)	(-32.81)
Investor protection	21.45***	1.13**	0.385***
	(6.12)	(2.06)	(4.50)
Stock market development/size	0.924***	0.972***	0.900***
	(12.80)	(14.50)	(12.53)
Emerging market dummy	-0.314*	-1.028***	-0.260
	(-1.95)	(-5.84)	(-1.63)
Liquidity	93.54***	96.70***	88.45***
	(11.25)	(12.42)	(10.99)
Equity market volatility	-0.811	-0.597	0.452
	(-1.57)	(-1.25)	(0.85)
Exchange rate volatility	-6.165***	-8.726***	-6.686***
	(-4.00)	(-6.47)	(-4.63)
Transaction cost	-7.714***	-6.321***	-7.256***
	(-13.84)	(-11.52)	(-13.10)
Economic policy risk	7.480***	4.624***	9.053***
	(5.02)	(3.15)	(6.07)
Financial policy risk	4.366***	4.965***	5.195***
	(4.65)	(5.55)	(5.41)

Equity market openness	0.717*	0.956***	1.075**
	(1.78)	(2.60)	(2.58)
Closely held firm	-0.657***	-1.059***	-0.653***
	(-2.81)	(-4.68)	(-2.82)
Common language dummy	0.384***	0.412***	0.352***
	(4.73)	(5.35)	(4.38)
Bilateral trade	1.961***	1.893***	1.871***
	(12.30)	(12.49)	(11.73)
Distance	-0.180***	-0.176***	-0.204***
	(-5.15)	(-5.29)	(-5.84)
Equity market correlation	0.0201	-0.0763	-0.238
	(0.09)	(-0.40)	(-1.20)
Historical returns	-1.762***	0.817	2.286***
	(-4.18)	(-0.97)	(5.22)
Time fixed effects	Yes	Yes	Yes
Overall R^2	0.821	0.849	0.786
Number of observations	2917	2917	2917

Table 8-6: Regression with lagged investor protection and all controls

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are one year lagged value of *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt-1} + Contols + \epsilon_{ijt}$$

Regressions estimated using random effect model. Test-statistics are given in parentheses (based on robust standard error allowing for clustering within the cross sectional units). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1% significance level.

	IPI	IPII
HBias	-0.955***	-0.960***
	(-99.84)	(-99.22)
Investor protection	1.320**	-0.761
	(2.78)	(-1.53)
Stock market development/size	0.518***	0.555***
	(21.89)	(24.02)
Emerging market dummy	-1.421***	-1.720***
	(-15.33)	(-19.75)
Liquidity	10.29***	9.686***
	(5.26)	(4.93)
Equity market volatility	-0.0925***	-0.105***
	(-5.01)	(-5.73)
Exchange rate volatility	-1.959***	-1.646***
	(-7.37)	(-6.76)
Transaction cost	-0.321***	-0.224***
	(-3.86)	(-2.68)
Economic policy risk	0.122**	0.294**
	(1.99)	(2.24)
Financial policy risk	0.862***	0.954***
	(4.69)	(5.70)

Equity market openness	2.226***	2.633***
	(15.32)	(17.32)
Closely held firm	-3.182***	-3.290***
	(-18.37)	(-20.16)
Common language dummy	0.532***	0.566***
	(7.59)	(8.11)
Bilateral trade	2.806***	2.744***
	(20.79)	(21.28)
Distance	-0.0922***	-0.0960***
	(-2.87)	(-3.18)
Equity market correlation	1.001*	-0.893***
	(1.95)	(-4.62)
Historical returns	0.188***	0.226***
	(5.16)	(6.27)
Time Fixed Effects	Yes	Yes
Overall R^2	0.839	0.857
Number of observations	2392	2392

Table 8-7: Regression with investor protection and all controls (free float home bias)

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral free float home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control.

$$w_{ijt} = \alpha + \beta_1 . Fl\_Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + Contols + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	IPI	IPII	IPIII
Free float home bias	-0.826***	-0.824***	-0.830***
	(-67.46)	(-66.95)	(-68.27)
Investor protection	2.415***	0.405	0.506***
	(4.42)	(0.42)	(4.72)
Stock market development/size	0.649***	0.648***	0.638***
	(23.14)	(23.04)	(22.87)
Emerging market dummy	-1.427***	-1.392***	-1.333***
	(-10.99)	(-10.78)	(-10.31)
Liquidity	7.857***	8.709***	8.109***
	(3.19)	(3.56)	(3.37)
Equity market volatility	-0.194***	-0.197***	-0.192***
	(-6.80)	(-7.03)	(-6.97)
Exchange rate risk	-1.304***	-1.121***	-1.140***
	(-3.66)	(-3.77)	(-3.74)
Transaction cost	-0.425***	-0.406***	-0.395***
	(-4.50)	(-4.30)	(-4.26)
Economic policy risk	0.495*	0.472*	0.498**
	(1.89)	(1.78)	(1.95)
Financial policy risk	0.442**	0.477**	0.464**
	(2.27)	(2.43)	(2.37)

Equity market openness	2.938***	2.903***	2.987***
	(15.99)	(15.23)	(16.33)
Closely held firms	-3.592***	-3.567***	-3.426***
	(-14.16)	(-14.38)	(-13.40)
Common language	0.280***	0.278***	0.137
	(2.77)	(2.79)	(1.32)
Bilateral trade	1.707***	1.710***	1.668***
	(11.97)	(12.13)	(11.67)
Distance	-0.333***	-0.330***	-0.398***
	(-7.66)	(-7.78)	(-8.52)
Equity return correlation	-1.436***	-1.457***	1.333
	(-5.41)	(-5.56)	(0.97)
Historical return	0.392	0.397***	0.397***
	(1.32)	(8.51)	(8.66)
Time fixed effect	Yes	Yes	Yes
Overall R^2	0.688	0.687	0.693
Number of observations	2910	2910	2910

Table 8-8: Major financial centres

The dependent variable ($w_{i,j,t}$). is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The key independent variables of interest are one year lagged value of *investor protection* measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII). The controls are bilateral home bias (*Hbias*), stock market development/size, liquidity/transaction cost, equity market volatility, bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries, three year moving average historical return, country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP) and capital control. Regressions estimated using random effect model.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . Investor\ protection_{jt} + Contols + \epsilon_{ijt}$$

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	IPI	IPII	IPIII
HBias	-0.938***	-0.939***	-0.939***
	(-94.43)	(-93.01)	(-93.13)
Investor protection	2.373***	-0.633	0.211**
	(2.77)	(-0.68)	(2.55)
Stock market development/size	0.664***	0.663***	0.659***
	(26.85)	(26.62)	(26.50)
Emerging market dummy	-1.416***	-1.432***	-1.370***
	(-12.73)	(-13.06)	(-12.61)
Liquidity	9.195***	9.584***	9.332***
	(4.51)	(4.78)	(4.72)
Equity market volatility	-0.173***	-0.174***	-0.173***
	(-6.02)	(-6.17)	(-6.12)
Exchange rate risk	-1.776***	-1.753***	-1.723***
	(-4.80)	(-5.79)	(-5.53)
Transaction cost	-0.535***	-0.545***	-0.531***
	(-6.14)	(-6.10)	(-6.09)
Economic policy risk	0.106**	0.126**	0.114**
	(2.19)	(1.97)	(2.23)
Financial policy risk	0.669***	0.668***	0.680***
	(3.59)	(3.57)	(3.60)

Equity market openness	1.632***	1.660***	1.669***
	(9.46)	(9.21)	(9.63)
Closely held firms	-3.008***	-2.990***	-2.933***
	(-15.57)	(-15.93)	(-15.22)
Common language	0.469***	0.469***	0.421***
	(6.22)	(6.33)	(5.61)
Bilateral trade	2.263***	2.310***	2.249***
	(10.84)	(11.20)	(10.77)
Distance	-0.146***	-0.141***	-0.175***
	(-3.97)	(-3.97)	(-4.42)
Equity return correlation	-0.962***	-0.956***	-0.902***
	(-3.93)	(-3.98)	(-3.69)
Historical return	0.312***	0.311***	0.313***
	(7.61)	(7.70)	(7.81)
Time fixed effect	Yes	Yes	Yes
Overall R^2	0.854	0.857	0.855
Number of observations	2362	2362	2362

Chapter 9 Fourth empirical study: Impact of foreign equity portfolio flows on global financial linkages of Asian emerging markets

Although most of the beneficial effects of foreign equity investments are supported with ample empirical evidences, there is extensive debate on destabilising effect of fickle and short-term nature of foreign equity portfolio flows, particularly in emerging markets. Similarly, there is also a growing concern that with the increase in foreign equity investments the emerging equity markets may become more susceptible to global shocks. Our fourth empirical chapter demonstrates the impact of foreign equity flows on global financial linkages of four Asian emerging markets. We test the following hypotheses:

H_{12} Foreign equity portfolio flows drive the global integration of the Asian emerging markets with the global equity markets.

H_{13} Foreign investors are "return chasers", i.e., flows are caused by changes in expected returns (i.e. feedback hypothesis).

H_{14} Increase in foreign equity portfolio flows raises domestic stock market price (i.e. price pressure hypothesis).

9.1 Descriptive statistics

Before we use rolling correlations and JJ cointegration methods for examining the long-run relationship and the different variants of the error correction model to investigate the short-term dynamics, we provide simple evidence on the descriptive statistics. With an aim to establish whether the pick-up in the foreign equity investments in more recent years following the impressive growth shown by the Asian equity markets provides greater empirical support to our hypotheses, the total sample is split into two parts. The first sub-period covers January 2001 to December 2003 and the second sub-period uses data for January 2004 to March 2007. The growth of foreign equity investment flows is evident from Table 9-1 which shows that the average equity investment flows more than doubled in the second period of the sample. The average net daily foreign equity flows rose to US$98.33 million during the period 2004-07 compared to US$45.57

million for the period 2001-03. The descriptive statistics for the returns series and the foreign equity investment flow is shown in Table 9-1. Over the full sample period, highest daily returns are offered by Korea followed by Thailand, India and Taiwan. All four Asian markets offer much higher daily returns compared to the returns of the MSCI developed market index. The trend is generally similar across the two sub-sample periods with the exception that returns offered by Thailand and Taiwan in the second sub-period are lower than returns in the developed markets. Higher returns in emerging markets do not come without risk as the standard deviations of returns are much higher for the Asian emerging markets. The returns are not normal and show significant kurtosis. The average daily foreign equity investment flows are much higher in the second sub-period. Taiwan leads the other markets in terms of foreign equity investment flows followed by India, Thailand and Korea.

……..Insert Table 9-1 about here, see page 191……

9.2 Results on long-run relationship

Table 9-2 presents the unconditional correlation coefficient between the domestic returns of the Asian emerging markets and MSCI world index. There is an indication of a move towards greater correlations from the first-sub period to the second sub-period for all markets with India and Thailand, in particular demonstrating relatively greater convergence in market movements. We present the rolling correlations for the four emerging markets with the global market in Figure 9-1 to Figure 9-4.[21] It is evident that though the correlations are not stable over time, a general trend of increasing correlation is evident. The correlations appear to have increased significantly from 2004 onwards which is confirmed from the increase in correlation in the second sub-period as shown in Table 9-2. Thus, the observed rise in correlation may partly be explained by the increase in the trading activity of foreign investors. This result is consistent with those reported by Phylaktis and Ravazzolo (2002) who also find significant correlations amongst the emerging Asian markets and the US.

……..Insert Table 9-2 about here, see page 192……

[21] Several papers have used rolling correlations in investigating the equity markets integration. For instance, Lucey and Kearney (2004) use rolling correlations and conclude that they provide a good indication whether markets are integrated or segmented.

……..Insert Figure 9-1 about here, see page 200……

……..Insert Figure 9-2 about here, see page 200……

……..Insert Figure 9-3 about here, see page 201……

……..Insert Figure 9-4 about here, see page 201……

Next, we employ the cointegration analysis, which is a more robust approach in testing for long-run equilibrium relationship. All series including the net foreign equity flow series are integrated of order I (1) whilst their first differences are integrated of order I (0). For adding robustness to our unit root test, we have reported the results from three different unit root tests. The Augmented Dicky Fuller Test statistics is reported in panel A of Table 9-3. As expected, all the test statistics are significant at 1% and 5% significance level for the first difference whereas the null of unit root cannot be rejected at level series. Further, the Philips Perron (PP) test was also applied, testing the null of unit root. PP tests include an automatic correction to the Dicky Fuller procedure allowing for the auto-correlated residuals. As shown in panel B, the results are similar and all series show the presence of unit root in their level with no unit root in their first difference. Unit roots tests are criticised for lacking power and therefore we also use the KPSS test. The results with the KPSS procedure are similar. The null of no unit root cannot be accepted in level series whereas the first difference null is accepted. For the ADF and PP tests, lag selection is based on the minimization of SIC. KPSS tests were conducted up to 10 lags, however to save space, only 1^{st} and 10^{th} lag findings are reported.

……..Insert Table 9-3 about here, see page 193……

Table 9-4 reports result of bivariate cointegration between the emerging Asian market returns and MSCI world index returns for the full sample period as well for the two sub-sample periods. For the full sample, one cointegrating vector is found for India and Taiwan whereas no cointegration is reported for Korea and Thailand. Further analysis reveals that whilst no cointegration is found for the first sub-period, results for the second sample period are similar to the full sample period

and statistically significant cointegrating vectors are found for India and Taiwan. The results show strong signs of convergence of the Indian and Taiwanese markets with the global markets. The greater degree of integration found for the second sample period coincides with the significant increase in the average foreign equity investment flow for India and Taiwan. The average foreign equity investment flows for India and Taiwan increased to US$36.65 million and US$54.19 million from US$9.841 million and US$33.22 million respectively. In comparison, the foreign equity investment flow did not show any increase in the case of Korea and a relatively smaller increase in the case of Thailand.

……..Insert Table 9-4 about here, see page 194……

Next, we present cointegration analysis results where we include foreign equity investment flow series with emerging market and world market return series. This analysis will provide us an indication of the relative contribution of foreign equity investment flow in long-run relationship reported in Table 9-4. The results of the tri-variate cointegration are reported in Table 9-5. Both the trace and max trace statistics are significant for the full sample period as well as the two sub-sample periods. With the inclusion of foreign equity flow, at least one cointegrating vector is reported for all four markets thereby confirming that the integration process is driven by the activities of foreign investors. For India, Taiwan and Thailand two significant cointegrating vectors are found for the second sample period confirming the influence of foreign equity flows in the integration process. A summary of the main findings of the cointegration analysis is further provided in Table 9-6.

……..Insert Table 9-5 about here, see page 195……

……..Insert Table 9-6 about here, see page 196……

9.3 Results on short-term dynamics

As previously discussed, the error correction provides feedback mechanism that measures the effect of a shock in one series as a result of a shock in another series in the VAR system. ECM can be applied only on cointegrated series. Since our cointegration analysis results show that all four markets are cointegrated when foreign equity investment flows are included, we include the

foreign equity investment flow data in the ECM analysis. Four variations of the ECM analysis are reported. The first variation is the block exogeneity via *Wald test* that measures the statistical significance of the flow of information between the variables in the form of Granger causality. The second is the error correction term which shows the magnitude and speed of short-term adjustment. Third is the decomposition of the error variance which provides a quantitative measure of the short-run dynamic flow of information explaining the *h*-step ahead error variance in one variable due to transmission of shock in another variable in the VAR system. Finally, the impulse response shows the time and direction of the effect of shocks between the variables.

Table 9-7 presents the Granger causality and Error Correction Term (ECT) for each market. It is evident that the world market has significant causal impact on the return index of emerging markets as well as on the flow of net foreign investments. In contrast, none of the emerging markets seem to have any causal effect on the world market returns. These findings are consistent with previous literature that has demonstrated that shocks from developed markets have significant impact on the Asian emerging markets (see for example, Dungey, 2004). Further, we find that net foreign equity investment flows Granger cause returns in India, Taiwan and Thailand but no causality is found for Korea.

Table 9-7 also reports the Error Correction Term (ECT) for all four markets as well as the foreign equity investment flows which are statistically significant implying that the short-term deviations in the integration process of the emerging markets with global markets are being corrected. The significant ECT for net foreign investment flows for all four markets confirms the considerable influence of foreign investment flow in correcting the short-term deviations in the integration process.

……..Insert Table 9-7 about here, see page 197……

The Granger causality results are consistent with the price pressure hypothesis suggesting that foreign equity investors are mainly responsible for the increase in the stock market valuations in the Asian emerging markets. This suggests that the Asian emerging markets may become increasingly vulnerable to the shocks in the volume of foreign equity investment flows and thus may become more volatile in future. This is a matter of concern to policy makers in emerging

markets and, as a consequence some countries have attempted to restrict the speculative investment flows in their equity markets.[22] Our results concerning the price pressure hypothesis are similar to those reported by Richards (2005) and much more pronounced than the ones documented by Froot et al (2001) for the Asian emerging markets. The results also confirm the positive feedback hypothesis since it is clear that returns from emerging markets Granger cause the foreign equity investment flows, a finding similar to the ones reported in Froot et al (2001) and Bekaert et al (2002). The findings further confirm that foreign investors are high-return chasers and extract information from recent returns.

Variance decomposition analysis presented in Table 9-8 shows that in the case of India, a significant proportion of domestic return error variance is explained by the world market returns and its share of error variance increases over time. In fact, its magnitude of explanation for the 20 day-ahead forecast variance is equal to 46 % of the proportion explained. For Korea and Taiwan, similar results are found which confirm the significant role of global markets in explaining the returns in the Korean and Taiwanese markets. For India, the proportion of variance explained by the net foreign equity flow is small but increases over time from 3% for 1 day-ahead forecast to 6% for the 20 day-ahead forecast. The foreign equity flows also seem to explain a large proportion of return variance of Taiwanese and the Thai markets. However, they have negligible share in explaining the error variance in the case of Korea. Overall, the variance in net foreign equity flows is significantly explained by world equity market returns which suggest that external shocks may significantly explain the volatility of foreign investments in emerging markets.

……..Insert Table 9-8 about here, see page 198……

Figure 9-5 to Figure 9-8 present findings of impulse response function analysis. In all cases, a unit cumulative innovation in world market returns has a significant and positive impact on the returns for all four markets. Innovations in net foreign investment flows also show strong and instantaneous effect in all markets. This evidence of contemporaneous price impact is consistent

[22] On 16 October 2007, India's stock market regulator proposed restricting the use of offshore participatory notes (PNs). PNs are much favoured by foreign investors, especially hedge funds who have been mainly responsible for US$90bn investment in PNs. In reaction to this news, the Indian stock market promptly fell by 9 per cent, triggering a temporary halt to trading.

with the one reported by Richards (2005) and is much stronger than the one documented by Froot et al (2001). The second set of figures present the response of net foreign investment flows to the lagged returns available in emerging markets as well as lagged investment flows and world market returns. The findings confirm the positive feedback hypothesis that foreign investors' activities are significantly influenced by the returns available in emerging markets. The Granger causality of local returns Granger causing flows also supports the feedback hypothesis.

……..Insert Figure 9-5 about here, see page 202……

……..Insert Figure 9-6 about here, see page 203……

……..Insert Figure 9-7 about here, see page 204……

……..Insert Figure 9-8 about here, see page 205……

9.4 Chapter summary

We utilize daily net foreign equity portfolio flows, local return and world return index for four Asian emerging markets and test the long run equilibrium association and short term dynamic relationships. Using the VECH mechanism we show that momentum and feedback hypotheses holds in all the markets and the growing foreign equity investments is leading the linkages of Asian markets with global financial markets. The study shows that the trading activities of foreign investors may render the local market susceptible to global shocks and may lead to greater equity market volatility.

Table 9-1: Descriptive Statistics

Panel A	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
Full Sample (01/01/2001 - 30/03/2007)							
Daily Average Net Foreign Equity Portfolio Investment (USD Millions)							
Korea	2.127	0.592	94.176	-91.166	15.180	0.324	8.871
India	23.764	10.387	776.766	-633.596	73.495	1.709	31.506
Thailand	2.965	0.000	394.502	-717.012	38.900	-1.879	92.750
Taiwan	44.109	22.962	654.287	-703.730	147.909	0.062	5.397
Daily Total Return (%)							
Korea	0.115	0.098	9.587	-11.457	1.834	-0.091	5.831
India	0.091	0.124	8.615	-11.264	1.442	-0.580	8.264
Thailand	0.100	0.038	11.094	-16.544	1.636	-0.318	11.988
Taiwan	0.043	0.000	6.524	-6.616	1.602	0.107	4.666
MSCI World	0.025	0.050	4.713	-3.620	0.859	0.065	5.782
Panel B							
First Sample (01/01/2001 - 31/12/2003)							
Daily Average Net Foreign Equity Portfolio Investment (USD Millions)							
Korea	2.160	0.592	64.639	-91.166	13.428	-0.384	11.335
India	9.841	5.183	262.340	-86.639	25.256	2.157	17.828
Thailand	0.350	-0.111	78.135	-102.278	13.441	0.038	11.343
Taiwan	33.222	12.701	524.051	-295.647	100.496	0.802	5.087
Daily Total Return (%)							
Korea	0.117	0.086	9.587	-11.457	2.089	-0.059	5.117
India	0.070	0.084	8.615	-11.264	1.433	-0.690	9.405
Thailand	0.127	0.047	7.813	-5.585	1.674	0.244	4.365
Taiwan	0.042	-0.029	6.524	-6.616	1.817	0.168	4.024
MSCI World	0.008	0.045	4.713	-3.620	0.983	0.120	5.013
Panel C							
Second Sample (01/01/2004 - 30/03/2007)							
Daily Average Net Foreign Equity Portfolio Investment (USD Million)							
Korea	2.10	0.56	94.18	-65.26	16.65	0.66	7.39
India	36.65	27.84	776.77	-633.60	97.32	1.01	19.05
Thailand	5.39	0.94	394.50	-717.01	52.31	-1.62	54.93
Taiwan	54.19	36.35	654.29	-703.73	180.53	-0.18	4.28
Daily Total Return (%)							
Korea	0.107	0.153	6.370	-7.065	1.420	-0.377	4.933
India	0.113	0.197	8.615	-11.264	1.517	-0.693	9.867
Thailand	0.038	0.012	11.094	-16.544	1.580	-1.059	20.949
Taiwan	0.046	0.021	6.524	-6.616	1.307	-0.313	6.280
MSCI World	0.055	0.067	2.095	-2.477	0.584	-0.222	4.009

Table 9-2: Unconditional correlation between domestic return and world return

	Full Sample	First Sample	Second Sample	Percent Change in Correlation between Two Sub Samples
Korea	0.248	0.221	0.325	47%
India	0.192	0.158	0.273	73%
Thailand	0.173	0.140	0.254	81%
Taiwan	0.199	0.171	0.272	60%

Table 9-3: Unit Root Tests: Full Sample Period (01/01/2001 - 30/03/2007)

Panel A: ADF Test Statistic (Lags 10 and Trend Allowed)

	Level Data		First Difference	
	Total Return Index	Net Foreign Equity Investment	Total Return Index	Net Foreign Equity Investment
World	-2.116	N/A	-12.888	N/A
India	-1.740	-1.574	-12.009	-9.744
Korea	-1.706	-1.221	-12.661	-8.977
Thailand	-2.758	-0.829	-12.342	-8.987
Taiwan	-2.115	-1.436	-13.321	-9.580
Critical Value (1%)= -3.96	Critical Value (5%)= -3.41			

Panel B: Phillip Perron Test Statistic

World	-5.335	N/A	-1353.924	N/A
India	-4.500	-1.877	-1499.024	-1549.160
Korea	-8.213	-1.659	-1555.851	-1208.984
Thailand	-0.938	-0.377	-1695.183	-1006.503
Taiwan	-11.234	-2.021	-1655.035	-1013.351
Critical Value (1%)= -20.50	*Critical Value (5%)= -21.80*			

Panel C: Kwiatkowski, Phillips, Schmidt and Shin (KPSS)

World				
Lag 1	15.900	N/A	0.049	N/A
Lag 10	2.940	N/A	0.050	N/A
India				
Lag 1	17.500	19.000	0.021	0.340
Lag 10	3.230	3.470	0.020	0.137
Korea				
Lag 1	9.510	8.830	0.042	0.344
Lag 10	1.780	1.610	0.047	0.175
Thailand				
Lag 1	6.760	16.900	0.037	0.301
Lag 10	1.270	3.090	0.040	0.126
Taiwan				
Lag 1	6.890	15.800	0.035	0.116
Lag 10	1.290	2.890	0.035	0.048
Critical Value (1%)= 0.216	*Critical Value (5%)= 0.146*			

Table 9-4: Cointegration Results - Domestic Return Index and World Return Index

	Eigenvalues		λ_{trace} test		λ_{max} test	
	r = 0	r ≤ 1	r = 0	r ≤ 1	r = 0	r =1
Full Sample						
India	0.015	0.000	24.070*	0.017	24.057*	0.017
Korea	0.007	0.000	11.805	0.007	11.798	0.007
Taiwan	0.008	0.003	17.160*	3.378	14.781*	2.378
Thailand	0.006	0.000	10.847	0.715	10.132	0.715
First Sample						
India	0.006	0.001	5.067	0.686	4.381	0.686
Korea	0.009	0.002	8.380	1.491	6.889	1.491
Taiwan	0.007	0.005	8.906	3.671	5.235	3.671
Thailand	0.006	0.002	6.619	1.891	4.728	1.891
Second Sample						
India	0.021	0.000	17.905*	0.004	17.901*	0.004
Korea	0.004	0.000	3.015	0.010	3.005	0.010
Taiwan	0.019	0.000	16.544*	0.000	16.544*	0.000
Thailand	0.010	0.000	8.876	0.056	8.819	0.056
	Critical Value at 95%		15.495	3.841	14.265	3.841

Table 9-5: Trivariate Cointegration Test (Net Foreign Equity Trading, Domestic and World Return Index)

	Eigenvalues			λ_{trace} Test			λ_{max} Test		
	r = 0	r ≤ 1	r ≤ 3	r = 0	r ≤ 1	r ≤ 3	r = 0	r = 1	r = 3
Full Sample									
India	0.022	0.004	0.000	43.864*	7.332	0.009	36.533*	7.323	0.009
Korea	0.015	0.004	0.000	30.695*	6.511	0.569	24.184*	5.942	0.569
Taiwan	0.037	0.007	0.000	72.363*	11.842	0.033	60.521*	11.809	0.033
Thailand	0.022	0.005	0.000	44.575*	8.493	0.536	36.082*	7.956	0.536
First Sample									
India	0.0788	0.0119	0.0041	76.332*	12.4826	3.1876	63.849*	9.2949	3.1876
Korea	0.0355	0.0221	0.0000	45.845*	14.5636	0.0482	28.281*	17.5155	0.0482
Taiwan	0.0340	0.0082	0.0013	34.336*	7.4521	1.0375	26.884*	6.4146	1.0375
Thailand	0.0321	0.0087	0.0022	33.914*	8.5023	1.6744	25.411*	6.8278	1.6744
Second Sample									
India	0.0270	0.0206	0.0006	41.188*	18.047*	0.4747	23.140*	17.573*	0.4747
Korea	0.0340	0.0036	0.0000	32.347*	3.0590	0.0401	29.287*	3.0180	0.0401
Taiwan	0.0272	0.0215	0.0002	41.854*	18.537*	0.1380	23.317*	18.398*	0.1380
Thailand	0.0822	0.0231	0.0003	92.567*	19.961*	0.2199	72.605*	19.741*	0.2199
	Critical values at 95%			29.80	15.49	3.84	21.13162	14.2646	3.841466

Table 9-6: Final Cointegration Result of local return with

Full Sample - 01/01/2001 - 30/03/2007		
	World Return Index	World Return Index and Net Foreign Equity Purchase
India	One	One
Korea	None	One
Taiwan	One	One
Thailand	None	One

First Sample - 01/01/2001 - 31/12/2003		
	World Return Index	World Return Index and Net Foreign Equity Purchase
India	None	One
Korea	None	One
Taiwan	None	One
Thailand	None	One

Second Sample - 01/01/2004 - 30/03/2007		
	World Return Index	World Return Index and Net Foreign Equity Purchase
India	One	Two
Korea	None	One
Taiwan	One	Two
Thailand	None	Two

Table 9-7: Granger Causality and ECM Result (Full Sample)

	Total Return Index					Net Foreign Equity Investment				
	World	India	Korea	Taiwan	Thailand	India	Korea	Taiwan	Thailand	ECT_{t-I}
World Return Index		62.97*	211.39*	186.12*	70.79*	35.32*	82.52*	196.92*	73.19*	
India Return Index	1.42					62.43*				-0.0007*
Korea Return Index	3.51						37.43*			1.46
Taiwan Return Index	4.23							25.16*		0.00
Thailand Return Index	3.15								40.35*	0.0027*
India - Foreign Investment	0.84	8.20*								0.0004*
Korea - Foreign Investment	0.59		4.5							5.48*
Taiwan - Foreign Investment	2.55			12.57*						0.0118*
Thailand - Foreign Investment	0.01				5.55**					-0.045*

** (**) Indicates Significance of the Chi-Square (t-for ECT) Statistic at 95% (90%)*

Table 9-8: Variance Decomposition

Period	World Return	Domestic Return	Net Equity Investment	World Return	Domestic Return	Net Equity Investment
		India			Korea	
		Domestic Return			Domestic Return	
1	5.665	90.691	3.644	8.192	91.808	0.000
5	33.461	61.493	5.047	39.096	60.790	0.114
10	40.398	53.706	5.896	42.391	57.525	0.084
15	44.113	49.748	6.139	43.403	56.527	0.069
20	46.911	46.872	6.218	43.871	56.069	0.059
		Net Foreign Equity Investment			Net Foreign Equity Investment	
1	0.144	0.000	99.856	0.161	0.509	99.330
5	11.176	1.521	87.302	12.296	8.885	78.819
10	14.241	2.192	83.567	16.894	10.473	72.633
15	14.681	2.865	82.454	18.457	11.770	69.773
20	14.583	3.549	81.867	19.373	13.043	67.584
		World Return			World Return	
1	100.000	0.000	0.000	100.000	0.000	0.000
5	99.932	0.020	0.048	99.931	0.030	0.039
10	99.904	0.071	0.025	99.912	0.027	0.061
15	99.813	0.170	0.017	99.907	0.025	0.067
20	99.684	0.303	0.013	99.906	0.024	0.070

Cont. Table 9.8

	Taiwan			Thailand		
		Domestic Return			Domestic Return	
1	3.086	83.380	13.534	2.343	76.666	20.991
5	24.010	60.100	15.890	12.156	71.207	16.637
10	26.701	57.000	16.299	13.779	69.641	16.580
15	27.561	56.002	16.437	14.411	69.039	16.551
20	27.982	55.511	16.508	14.803	68.700	16.497
		Net Foreign Equity Investment			Net Foreign Equity Investment	
1	0.577	0.000	99.423	0.140	0.000	99.860
5	15.172	0.873	83.955	4.573	1.329	94.098
10	18.767	1.093	80.140	5.396	1.553	93.051
15	20.948	1.241	77.811	5.613	1.650	92.738
20	22.836	1.375	75.789	5.688	1.717	92.595
		World Return			World Return	
1	100.000	0.000	0.000	100.000	0.000	0.000
5	99.939	0.014	0.046	99.727	0.260	0.013
10	99.954	0.020	0.026	99.722	0.270	0.008
15	99.950	0.026	0.024	99.756	0.237	0.006
20	99.938	0.032	0.030	99.790	0.201	0.009

Figure 9-1: Rolling Correlation between Indian Domestic Return and World Return

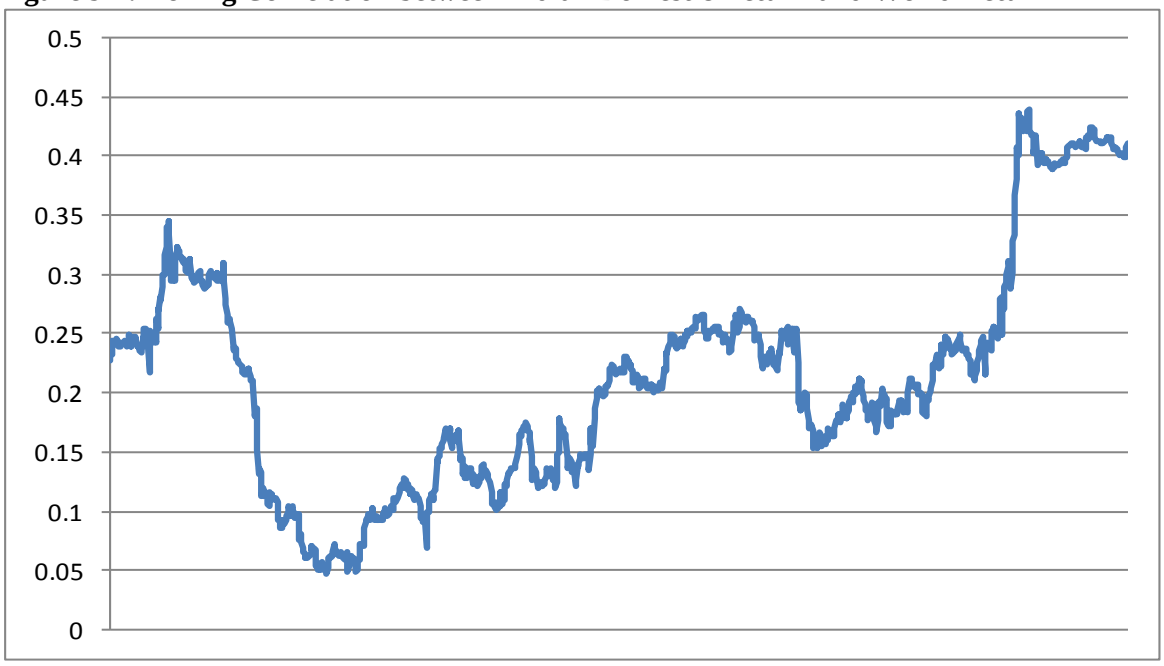


Figure 9-2: Rolling Correlation between Korean Domestic Return and World Return

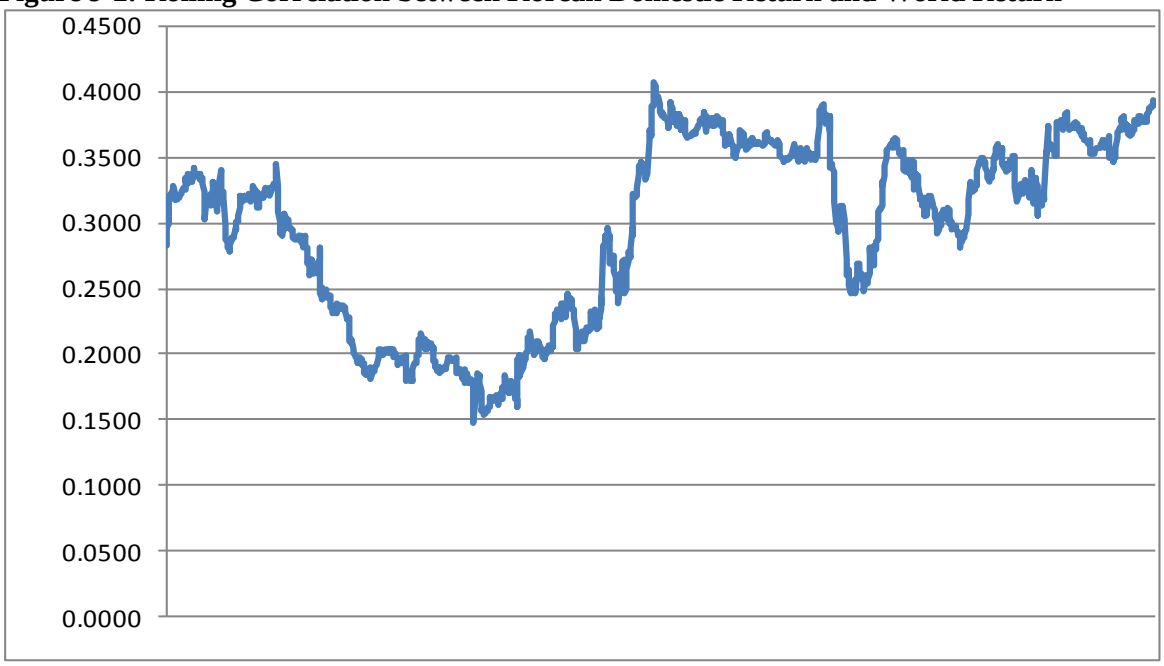


Figure 9-3: Rolling Correlation between Taiwanese Domestic Return and World Return

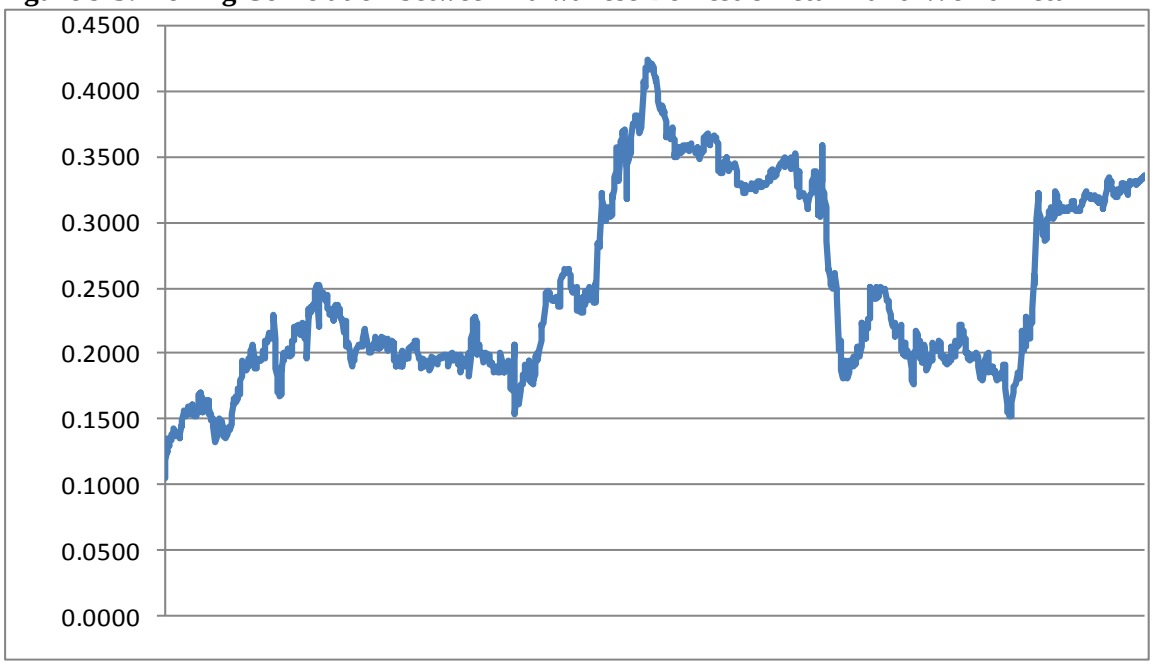


Figure 9-4: Rolling Correlation between Thai Domestic Return and World Return

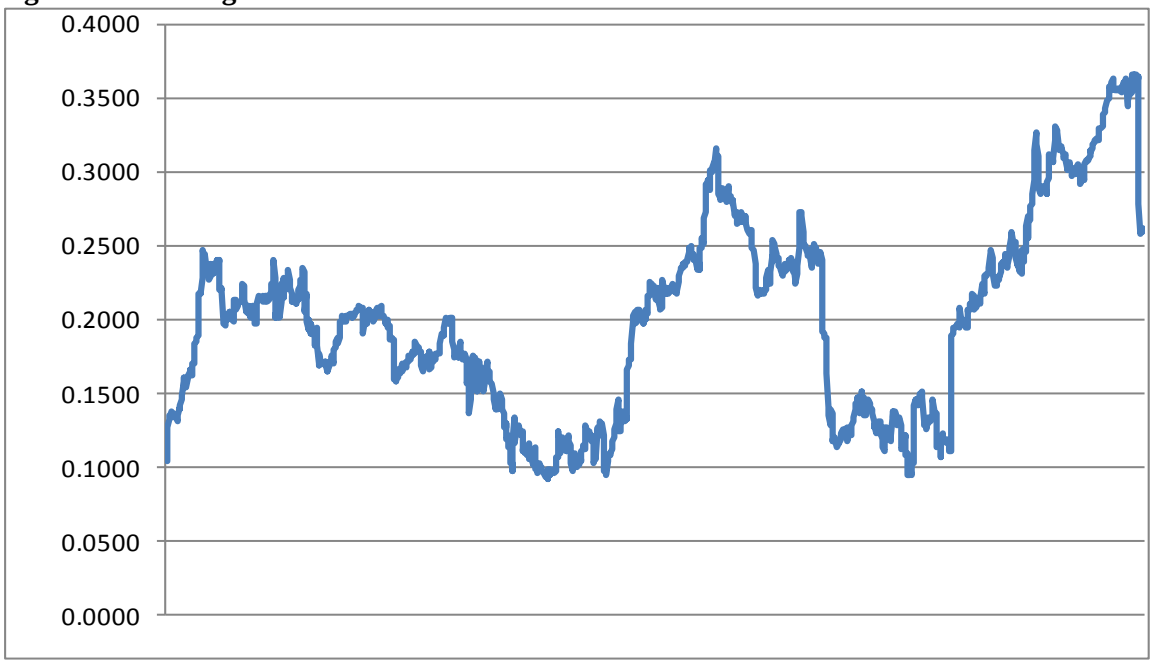


Figure 9-5: Impulse Response Function – India

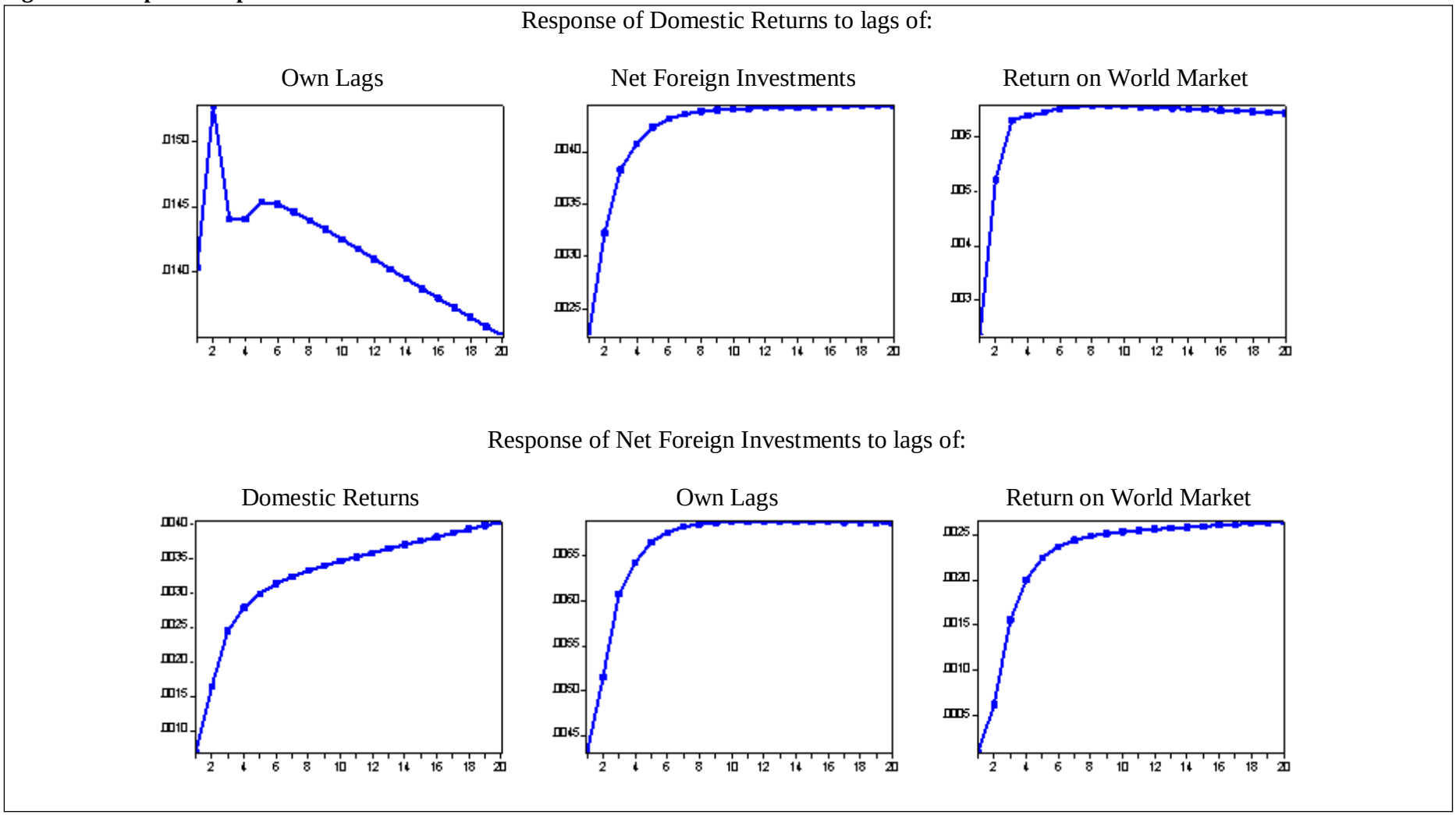


Figure 9-6: Impulse Response Function – South Korea

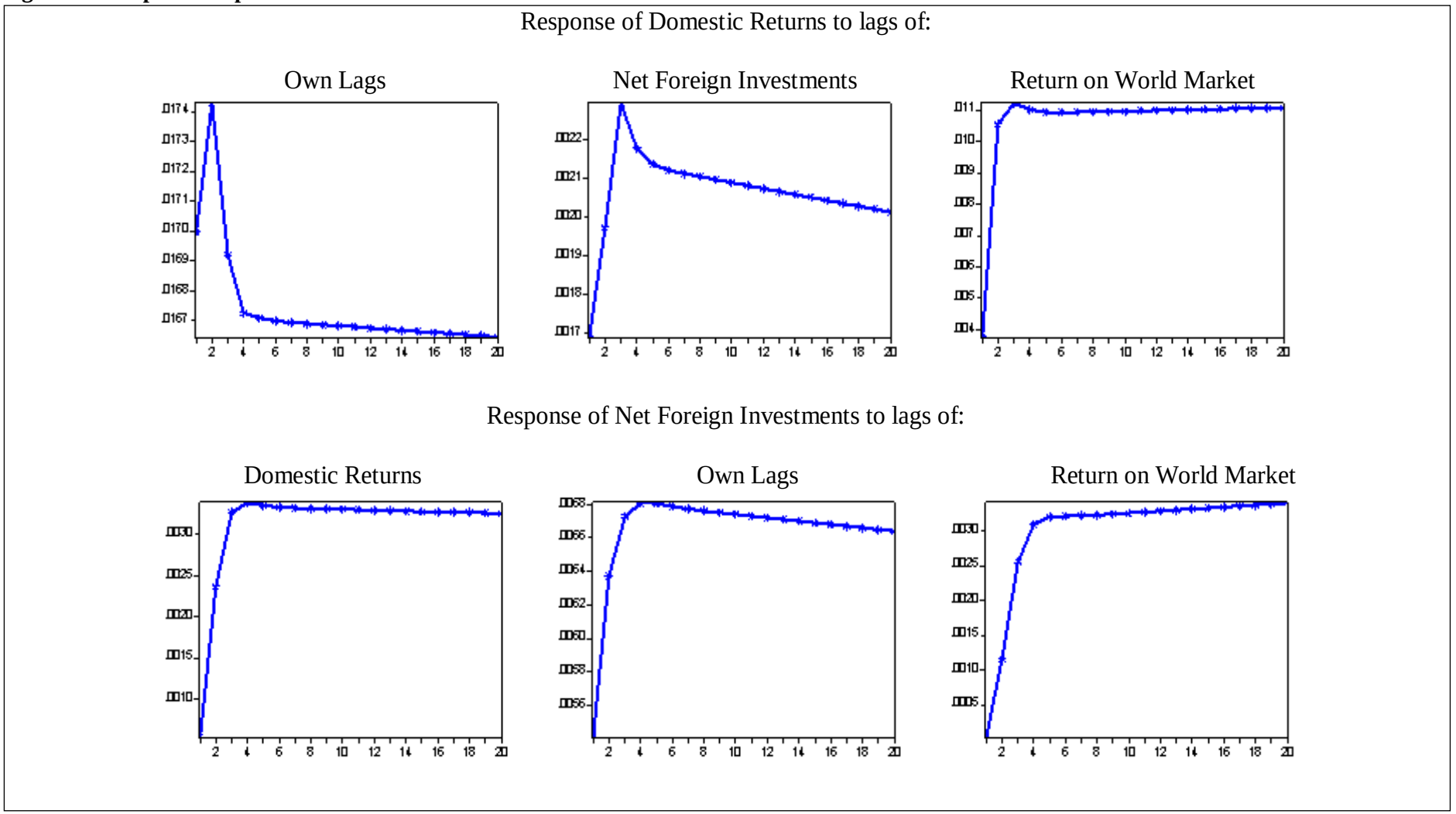


Figure 9-7: Impulse Response Function – Thailand

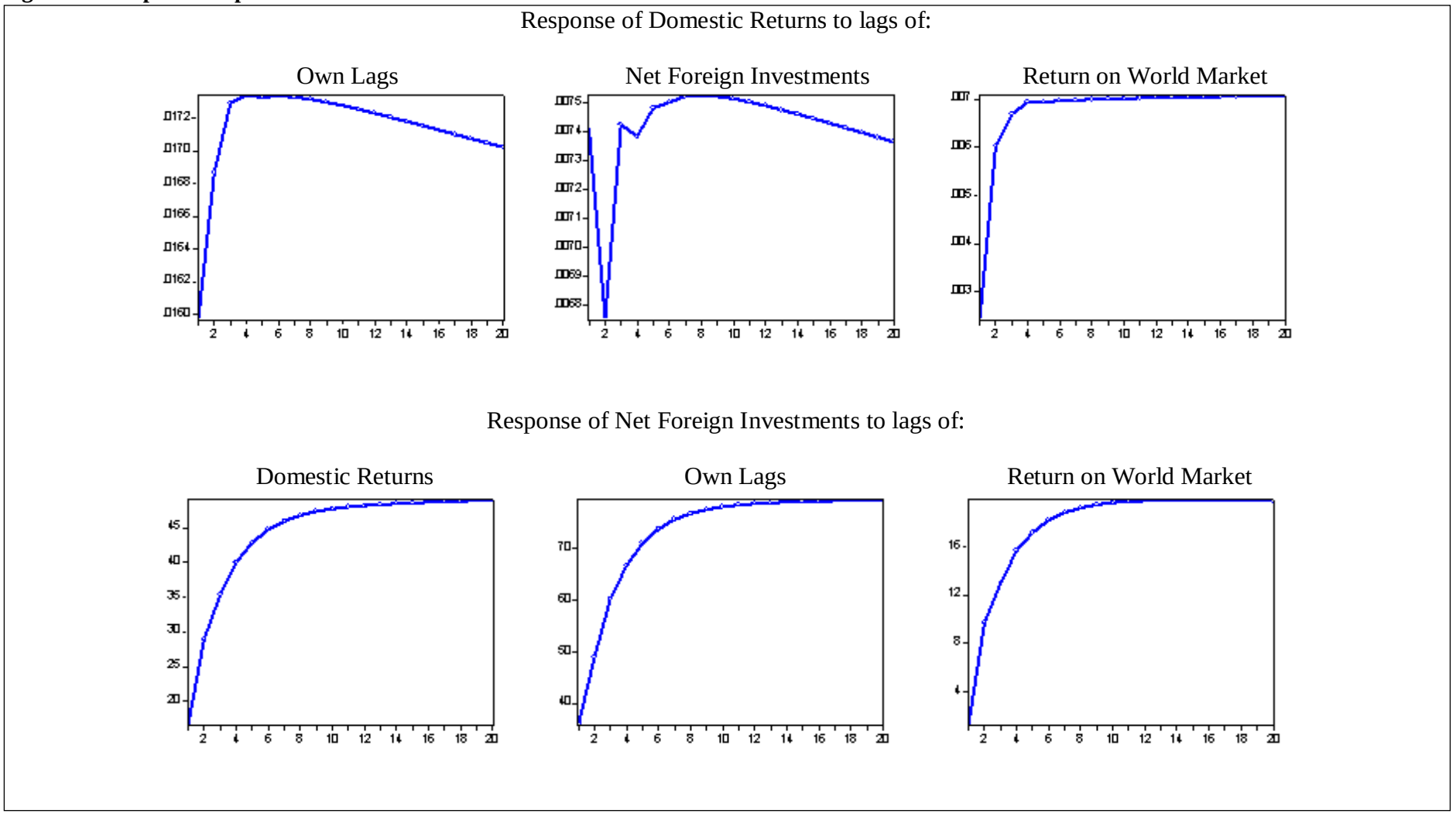
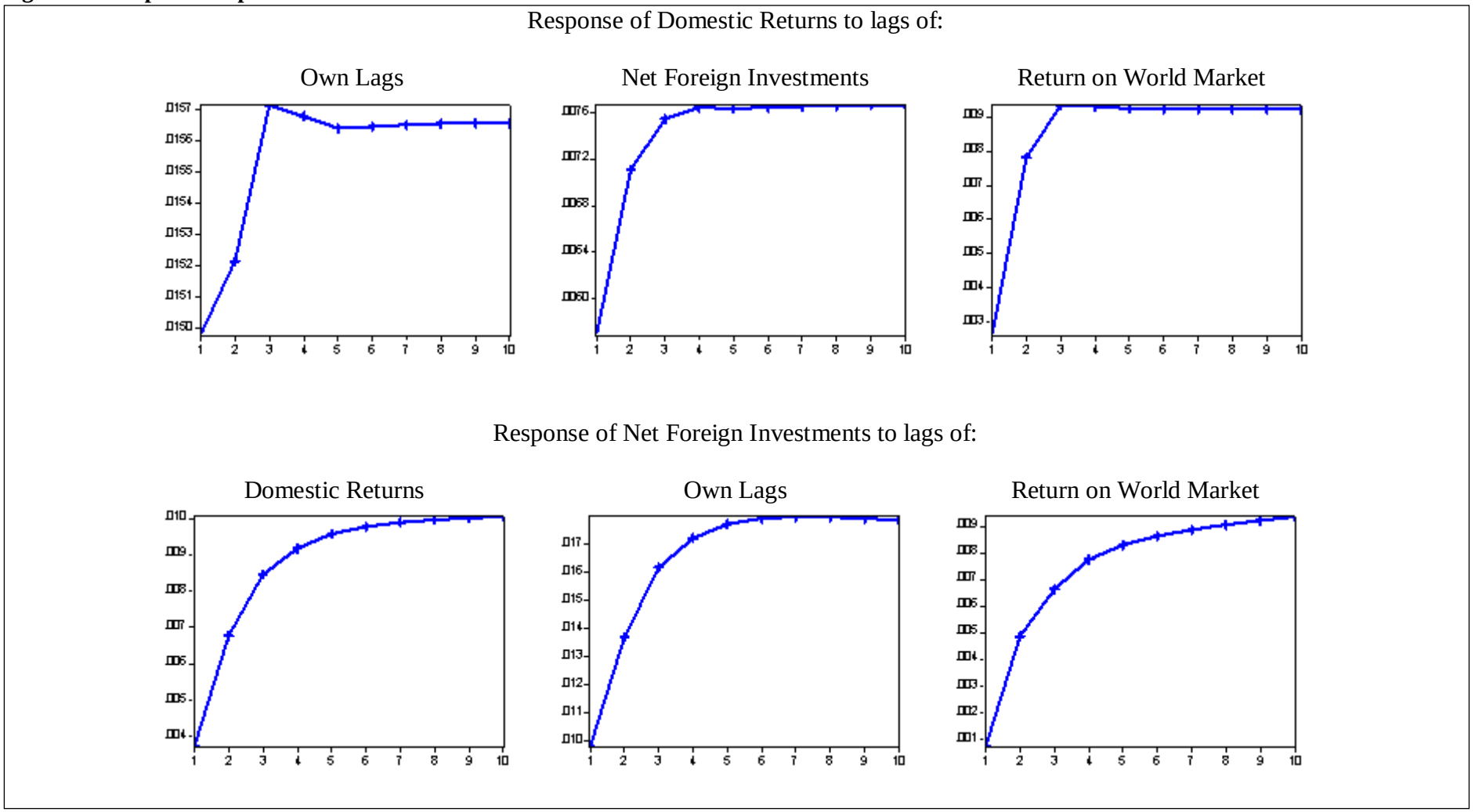


Figure 9-8: Impulse Response Function – Taiwan



Chapter 10 Summary, conclusion and limitations

10.1 Introduction

This thesis comprises four empirical studies (chapters 6-9). In the following sections we report summary of first three empirical studies along with the final regression specification of foreign equity portfolio holdings (FEPH). The first three empirical chapters (6-8) examine various hypotheses examing the determinants of FEPH? The fourth empirical study demonstrates the impact of foreign equity portfolio flows on global financial linkages of four Asian emerging markets (chapter 9). We conclude the chapter with brief discussion of key contribution, policy recommendations, limitation of the study and suggest future research direction.

10.2 Summary and conclusion: Determinants of global foreign equity portfolio holdings

Errunza (2001) argues that growth in foreign equity portfolio investment plays a pivotal role in the development of local capital markets. There is overwhelming evidence in support of the contribution of foreign equity portfolio investment in efficient risk sharing and resource allocation, mobilization and improvement in the overall structure of external finance, and development of domestic capital markets. These developments and growing financial globalization reduce the cost of capital, which in turn, further leads to favourable evaluation of investment projects and ultimately promotes economic welfare.

Given the importance of foreign equity portfolio investments, as discussed above, our study aims to answer the question: What determines the cross-country and temporal variation of foreign equity portfolio holdings? In other words, why investors choose to hold higher volumes of equity portfolio investments in certain countries and lower in others?

Following Markowitz's (1952) portfolio optimization framework it is widely recognised that international diversification of equity portfolios offer potential gain via risk reduction (Grubel, 1968; Levy and Sarnat, 1970; Solnik, 1974; Grauer and Hakansson, 1987; Errunza, 1988 and DeSantis and Gerard, 1997). Although few studies (Jorion, 1985; Farragher and Hui, 1985 and Goetxmann et al., 2001) argue that diversification benefits are not as pronounced as indicated in the earlier literature there is a general agreement that international investments offer significant benefits. If investments in foreign equities offers the benefit of diversification then what is the optimal level of foreign equity portfolio that should be held in domestic portfolio?

Motivated by the extension of domestic capital asset pricing model of Sharpe (1964), Lintner (1965) and Mossin (1966) in international setting, International Capital Asset Pricing Model (ICAPM) suggests that every investor should hold the world market portfolio. However, a number of theoretical models (Alder and Dumas, 1983; Solnik, 1974b; Cooper and Kaplanis, 1986, 1994 and Stulz, 2005) illustrate why investors may not follow the suggestion of ICAPM. Most of the equilibrium models attack the unrealistic assumptions of ICAPM which assumes that markets are perfectly integrated and fully efficient, purchasing power parity holds, no transaction costs, and there are no barriers to international investments. The theoretical models demonstrate that the presence of market frictions/barriers, such as real exchange rate risk, market inefficiency, illiquidity, institutional risk, information asymmetry etc. invalidates ICAPM and investor may therefore deviate from holding the world market portfolio. Cooper and Kaplanis (1986) demonstrate how the presence of deadweight costs, potentially generated by barriers/market frictions to international investments, may restrict foreign investors in holding the world market portfolio (please see chapter 2 for detail explanation of the model).

On the empirical front, several studies explain the phenomenon of home bias (tendency to overweight home markets contrary to ICAPM prescription), particularly using survey and U.S. equity portfolio data. A number of factors have been suggested to explain home bias, including information asymmetry, behavioural factors and institutional factors. In view of the extensive assessment of extant literature only few studies (two to the best of our knowledge) have modelled the bilateral cross-country foreign equity portfolio holdings (FEPH) on a global basis. One of the reasons cited for scant studies in modelling of FEPH is the lack of high quality and comprehensive bilateral cross-country equity holding data (Chan et. al., 2005). We make use of bilateral cross-country equity holding data recently available by the Co-ordinated Portfolio Investment Survey (CPIS) of International Monetary Fund. Our study uses a comprehensive panel data set on 36 host countries with bilateral investments from 16 source countries for a period of 6 years (2001-2006). We are able to exploit over 500 cross sectional units yielding over 3000 observations and make important contributions by extending the sparse literature of modelling FEPH (see Chapter 2, section 2.8 for details). Drawing on the theoretical and empirical literature we construct an estimate of country level foreign equity portfolio allocation (FEPA) and investigate the role of different factors explaining cross sectional and temporal variation of FEPA. Based on the theoretical framework of Cooper and Kaplanis (1986) we identify various factors which could explain the country allocation of foreign investors and test a number of hypotheses (see Chapter 3 for details on hypotheses development). Unlike

previous studies (except Gelos and Wei, 2005) which use cross-section models, we test all our hypotheses using relatively more efficient *random effect* and more robust *fixed effect* panel data models.

The first set of hypotheses demonstrates the association between transaction cost and FEPA (see chapter 6). We use handpicked data on three different components of transaction costs (commission, fees and market impact) from S&P stock market fact books and test whether the three components of transaction explains FEPA (see Chapter 6). To the best of our knowledge we are first to comprehensively test the role of each of the components individually and collectively in modelling FEPA. We undertake a number of sensitivity analyses in our regressions and address issues such as omitted variable bias, unit specific effect, reverse causality, free float home bias, effect of major financial centres and between effect estimations. The results show strong and robust effect of transaction costs with clear evidence that foreign investors tend to underweight countries with higher transaction costs.

The second set of hypotheses investigates the role of country specific equity market characteristics (CSEMC) explaining FEPA (see Chapter 7). We use stock market development/size, market liquidity, emerging market dummy, equity return volatility and exchange rate volatility to proxy the effect of CSEMC. We are first to use the two volatility measures in modelling FEPA and justify their inclusion with strong theoretical arguments (see chapter 3, section 3.2.4 and 3.2.5). Tackling different robustness issues the results show that all CSEMC factors tend to have strong and statistically significant effect on the foreign equity portfolio allocation decisions of foreign investors.

The third set of hypotheses examines the relationship between investor protection and FEPA. The existing findings on the role of investor protection are highly controversial with divided views and contrasting conclusions. Most of the investor protection measures used in the literature lack time dimensions. Within the framework of panel data set and following Bekaert et al., (2007) we include the ICRG's *investment profile* index to capture the features of investor protection risk specifically reflecting the government's attitude towards foreign investment. We also use ICRG's *quality of institution* index to represent a measure of investor protection signifying the quality of broad based country specific regulatory environment. Finally, following La Porta et al., (1997, 1998, 2000), who show that countries following Common English Law are better at instituting and enforcing investor protection rights, we use a dummy

which takes value of one if a country follows Common English Law and zero otherwise (see Chapter 8).

Our results show that *investment profile* and *English common law dummy* are highly statistically significant across all specifications. However, *quality of institution* is not able to stand different robustness tests implying foreign investors may not be interested in the broad based general investor protection right measure index rather they are more concerned about the regulatory framework which directly affects their investments (see section 3.5 of chapter 3 for the argument).

After testing hypotheses in the most robust and efficient way we are able to suggest on a final regression specification as shown in Table 10-1. We look at the magnitude of the R^2 across different regression specifications providing an indication of the relative explanatory powers of the different groups of regressors. The results presented in Table 10-1 not only shows the final best fitted specification but it also signals the relative importance of transaction cost measures (specification 2, column 3), country specific equity market characteristics (specification 3, column 4), investor protection right measures (specification 4, column 5) and the control variables (final specification, column 6). Specification 1 (column 2) shows regression results including only the home bias measure. As expected, it is highly significant and alone explains almost 13% of the total variation in FEPA. Next we include the transaction cost measures (TC1, TC2 and TC3) and the results demonstrate that not only all transaction cost measures are statistically significant at the conventional 5% level but also the overall R^2 improves by 23%. We would like to add a caveat for using the R^2 metric because there is difference between the sample sizes of both specifications. However, since the difference is not substantial we believe that the comparative R^2 measure is justified.

……..Insert Table 10-1about here, see page 214……

Addition of country specific equity market characteristics (CSEMC) further significantly improves adequacy of the model by almost 30% indicating CSEMC as the most significant features influencing the decision of foreign investors. The results are also consistent with previous studies (Chan et al., 2005). Similarly, the addition of investor protection rights further augments the fitness of the model by 4%. Although statistically significant, investor protection measures are relatively not as important as the transaction cost and CSEMC measures. The

addition of control variables and time dummies further adds value in explaining the FEPA by improving the R^2 to almost 86%.

In light of the reported results of our first three empirical studies, we conclude that among others, CSEMC, including transaction cost and volatility measures are the most important factors influencing foreign investors' country allocation decision. It appears investors are more inclined to invest in markets, which are more developed in terms of market capitalization, highly liquid with lower transaction costs, relatively more efficient in terms of information disclosure and have sound and efficient country level corporate governance culture.

10.3 Summary and conclusion: Impact of foreign equity flows on global financial linkages of four Asian emerging markets.

Our final study demonstrates the impact of net foreign equity flows on global linkages of four Asian emerging markets (chapter 9). The issue of destabilizing effect of foreign equity investment flows for the emerging markets are debatable (see chapter one, section 1.3.3) with divided conclusions. Given the limitation of data availability on net equity portfolio flows we use daily net foreign equity investment flows and stock index return available for four Asian emerging markets of India, Korea, Taiwan and Thailand for 2001-2007. Our study uses a number of variants of VEC model for examining the long-run equilibrium relationship and shor-run dynamics of flows with local equity markets.

The findings suggest that greater integration of the Asian emerging markets with global equity markets appears to be influenced by the increasing investments of foreign investors. Analysis of short-run impact confirms that the global markets have a significant causal effect on equity returns of all four emerging markets. More notable is the finding that foreign equity investment flows play a significant role in correcting the short-term deviations in the convergence process of Asian emerging equity markets with the global equity markets. Whilst the results are consistent with previous research, we find stronger evidence for positive feedback hypothesis for all four markets. The results support the widely-held view that foreign investors are return chasers and their trading behaviour in emerging markets is based on information drawn from recent returns. The results also confirm the price-pressure hypothesis suggesting foreign equity investors are mainly responsible for the increases in the stock market valuations in the Asian emerging markets. In view of the empirical evidence presented in this study, the Asian

emerging markets may become increasingly vulnerable to shocks in the volume and pace of foreign equity investment flows and turn more volatile in future.

10.4 Key contribution

We have claimed the academic contributions of each empirical study in the previous chapters. Here we briefly discuss the core contribution of our study extending the literature on foreign equity portfolio investment.

One of the important contributions of this study is that it offers useful insights in explaining why foreign investors do not comply with the normative predictions of the International Capital Asset Pricing Model (ICAPM). As discussed earlier in the thesis, the ICAPM suggests that each investor should hold the world market portfolio. However, there is scant literature on whether the theoretical predictions of ICAPM empirically hold. Although a number of alternative theoretical models have emerged over time, the empirical evidence suggesting key factors that cause investors to deviate from holding the world market portfolio is rather limited. One of the key reasons for the lack of studies is the non-availability of high quality data. With the help of recently available high quality data and a thorough econometric analysis, this study highlights a number of direct and indirect barriers creating deadweight costs for foreign investors in holding the equity portfolio of a particular country. The findings show how the different barriers to foreign investments explain the cross-sectional and temporal variations in foreign equity portfolio allocations.

The theoretical implications of the study are profound. The ICAPM does not hold in practice because a number of underlying assumptions do not hold when tested with real data. The thesis demonstrates that though ICAPM is a good starting point it is an inadequate model for explaining the equity portfolio allocation decisions of foreign investors.

10.5 Policy recommendation

It is evident that foreign investments in the local equity markets have positive impact in developing the local equity markets. However, foreign investors may also have adverse effects, as seen during the 1994 Mexican and 1997 South Asian crises. If capital market infrastructure, information disclosure climate and investor protection institutions are weak, investors may be tempted to withdraw their investment at the slightest sign of trouble in emerging markets (see Gelos and Wei, 2005). Investors may follow momentum strategy and at the slightest hint of

negative news may divest their investment in absence of transparent, reliable and developed market infrastructure. The presence of weak, underdeveloped and opaque market infrastructure may further lead to herding behaviour (Gelos and Wei, 2002). Such irrational trading attitude may have significant and damaging impact on the country's exchange rate, complicate monetary policy, and may consequently have severe destabilising effect, i.e. increase the volatility of equity markets. These effects may be particularly severe if the local equity markets exhibit the prevalence of strong price-pressure effect. Based on the results of our four empirical chapters we offer the following policy recommendations:

First and most importantly, countries should create an environment that should attract (and retain) foreign equity portfolio investment on a permanent basis. National policy makers, particularly in emerging markets, should take necessary measures to develop their local capital markets. Policy makers should undertake and implement regulatory reforms to ensure their local market grows in size and level of development providing enough diversification opportunities and adequate liquidity at low cost. Similarly, the reforms must ensure that the market is efficient enough for disseminating timely, reliable and adequate information. Such effort also has positive impact on market microstructure environment of efficient price discovery process and reduces the excess volatility. Trading mechanism should be as cost effective as possible diminishing risk premium for investor, which in turn, further increases the valuation of local equities. Furthermore, a good corporate governance culture protecting the rights of foreign investors is also a prerequisite. National policy makers should create an environment of efficiently enforcing property rights contracts and ensuring smooth repatriation and payment process.

Conclusively, commitments to improve the above mentioned preconditions necessary for well-functioning markets are pivotal, particularly during period of distressed conditions so as to ensure that foreign investors trade rationally and avoid following irrational momentum and herding behaviour.

10.6 Limitation and future research

Although we have made efforts to ensure our study is as robust as possible there are some limitations worth mentioning. One of the shortcomings is the unavailability of data on frontier equity markets. Despite the fact that we have used a comprehensive set of countries (36 in total), the addition of so called frontier markets such as Vietnam, Bangladesh, Middle East

countries etc. could have made our study more robust and efficient. As in other studies, lack of adequate data compelled us to exploit emerging and developed markets only. However, with 36 counties we have been able to ensure enough variation (temporal and cross sectional) to test our hypotheses using the best possible robust and efficient panel data methods.

Intuitively, transaction cost and other measures used in our study should also affect portfolio flows. However, the actual portfolio flow data is not available. We find that the proxy portfolio flow constructed by taking the first difference of the holdings data do not fully reflect actual flows since the change may be caused by changes in valuation of the holdings over time. Fidora et al., (2007) uses the same data set for 2001-2003 in studying home bias and note "… changes over time are very small and mainly reflect valuation changes rather than cross-border investment flows….(p.643)". Consequently, it is not surprising that none of the variables are able to explain the proxy portfolio flows based on the first difference of the holdings data.

We have not undertaken a range of empirical possibilities given the comprehensive data set, such as regional/country differences in terms of average allocation as well as time and cross sectional variation of the slope coefficients for each of the variables used. We contemplate to undertake the possibilities of such studies in near future. Similarly, we also intent to conduct a primary research surveying global fund managers operating in U.K. Finally, most of our studies only focus on the determinant side (except the fourth empirical study). In view of extensive review of the existing literature there is immense scope for testing various hypotheses looking at the impact of foreign equity portfolio allocations. It will be particularly interesting to test various theoretical hypotheses focussing on the impact of foreign equity portfolio investments on stock market development, cost of capital, market liquidity, investor protection and bilateral information asymmetry.

10.7 Dissemination of research

In terms of disseminating our research to a wider academic community, we have developed four empirical papers. Three of the papers have been published in peer reviewed journals with the fourth one under review with a journal of international standing. Please see appendix A for details.

Table 10-1: Relative importance of key variables and final regression specification of Foreign Equity Portfolio Holdings

The dependent variable ($w_{i,j,t}$) is the log value of country wise bilateral foreign portfolio allocation from country *i* in country *j* at time *t*. The first set of key independent variables of interest are three *Transaction Costs* (in basis points and scaled by 100) include TC1 (commission) TC2 (fees) and TC3 (market impact). The second set of key independent variables of interest are the five measures of country specific equity market variables (*CSEMC*), which includes stock market development/size, market liquidity, emerging market dummy, equity market volatility and exchange rate volatility. The final set of factors of interest are investor protection measures which includes investor profile (IPI), quality of institution (IPII) and English common law dummy (IPII).

The controls are bilateral home bias (*Hbias*), country financial risk (components are: foreign debt as % of GDP, exchange rate stability, foreign debt as % of total export and services, current account as % of exports and services and international liquidity), country economic risk (components are: GDP per head, Real GDP growth, inflation rate, budget balance as % of GDP, current account as % of GDP), capital control measures - equity market openness, closely held firms factor and bilateral information asymmetry variables bilateral trade, common (pair countries) language dummy (pair countries), log distance between capital cities of the pair countries,. Regressions estimated using random effect model. The models are estimated using random effect estimation method.

$$w_{ijt} = \alpha + \beta_1 . Hbias_{ijt} + \beta_2 . key\ variables\ of\ interest + Contols + \epsilon_{ijt}$$

Specification 1 only includes home bias.
Specification 2 includes home bias and all the transaction cost measures.
Specification 3 includes home bias, all transaction cost measures and CSEMC variables.
Specification 4 includes home bias, all transaction cost measures, CSEMC variables and investor protection measures.
Final specification includes home bias, all transaction cost measures, CSEMC variables, investor protection measures and all other controls including time dummies.

Test-statistics are given in parentheses (based on robust standard error (SE) allowing for clustering within the bilateral asset allocation i.e. cluster adjusted SE corrected for arbitrary heteroskedasticity and auto-correlation). All the coefficients are interpreted as elasticity. Significant coefficients are indicated with * denoting significance at 10%, ** at 5% and *** at 1%.

	Specification 1 (Home Bias)	Specification 2 (Transaction Cost)	Specification 3 (CSEMC)	Specification 4 (Investor protection)	Final Specification
HBias	-0.887	-0.888***	-0.934***	-0.940***	-0.932***
	(-51.88)	(-46.96)	(-82.22)	(-82.48)	(-97.10)
TC1(commission)		-3.418***	-1.130***	-1.111***	-0.769***
		(-15.11)	(-8.39)	(-8.11)	(-6.44)

TC2 (Fees)	-0.377 (-0.82)	-0.713*** (-2.86)	-0.774*** (-3.12)	-0.970*** (-4.73)
TC3(Market Impact)	-0.684*** (-5.77)	-0.653*** (-6.06)	-0.534*** (-5.17)	-0.481*** (-4.42)
Stock market development/size		0.785*** (42.54)	0.764*** (40.35)	0.695*** (32.32)
Liquidity		9.591*** (4.91)	10.97*** (5.61)	11.95*** (6.22)
Emerging market dummy		-2.349*** (-25.61)	-2.201*** (-24.06)	-0.983*** (-12.94)
Equity market volatility		-0.134*** (-6.04)	-0.136*** (-6.20)	-0.137*** (-5.64)
Exchange rate volatility		-3.389*** (-10.94)	-3.326*** (-11.03)	-2.230*** (-7.04)
Investor protection (investment profile)			5.304*** (6.27)	2.497*** (3.10)
English common law dummy			0.323*** (3.43)	0.298*** (3.91)
Financial policy risk				0.703*** (4.16)

Economic policy risk					0.229** (2.11)
Equity market openness					1.717*** (11.32)
Closely held firm					-2.704*** (-15.47)
Common language					0.385*** (5.34)
Bilateral trade					2.618*** (16.11)
Distance					-0.118*** (-3.71)
Time fixed effects					Yes
Overall R^2	0.128	0.355	0.659	0.695	0.863
Number of observations	3196	2917	2917	2917	2917

Appendix: Dissemination of research

Peer reviewed publications (co-authored with Prof. Sunil Poshakwale)

1. International equity portfolio allocations and transaction costs, ***Journal of Banking and Finance***, 34, 11, 2627 – 2638.

2. The Impact of foreign investment flows on global linkages of the Asian emerging equity markets (2009), ***Applied Financial Economics***, 19, 22,1787 - 1802

3. Foreign investors and global integration of Indian equity market (2010), ***Journal of Emerging Markets Finance***, 9, 1, 1- 24

Paper under review

1. Investor protection and foreign equity portfolio holdings (***Global Finance Journal***)

   Stage: First round review

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